Stanisław Leśniewski: bibliography in English (Ino - Lej)

Contents of this Section

This part of the section Ontologists of 19th and 20th centuries includes the following pages:

Studies on Leśniewski in English

1. Inoué, Takao. 1994. "The single axiom-schema of March 8th." *Bulleliu of Lhe SecLion of Logic* no. 24:115.
Get a single axiom-schema for Ishimoto's propositional fragment (see [2], [3] and [1]) of Leśniewski's ontology..
References
[1] T. Inoué, Hintikka formulas as axioms of refutation calculus, a case study, *Bulletin of the Section of Logic*, 24/2 (1995), str. 105-114.
[2] A. Ishimoto, A propositional fragment of Leśniewski's ontology, *Studia Logica,* 36 (1977), pp. 285{299.
[3] M. Kobayashi and A. Ishimoto, A propositional fragment of Leśniewski's ontology and its formulation by the tableau method, *Studia Logica,* 41 (1982), pp. 181{195.
2. ———. 1995. "Partial interpretations of Leśniewski's epsilon in von Wright-type deontic logics and provability logics." *Bulletin of the Section of Logic* no. 24:223-233.
"In this paper, we shall propose similar interpretations of Leśniewski's epsilon in von Wright-type deontic logics (i:e: Smiley-Hanson systems of monadic deontic logics) and in provability logics (i:e: the full system **PrL** of provability logic and its subsystem **BML**), respectively.
I believe that by this paper, we have a promising step into a recognition that existence, normative concepts and provability(2) have something common to their theories, which seems to me philosophically very interesting." (pp. 223-224)
(2) 2This list can surely be made longer. For example, the deontic logic dealt with in this paper can be interpreted in alethic modal logics with a propositional constant (see [1]).
References
[1] L. Aqvist, *Deontic logic*, in [2] , pp. 605-714.
[2] D. Gabbay and F. Guenthner (eds.), *Handbook of Philosophical Logic, vol. II: Extensions of Classical Logic,* D. Reidel, Dordrecht, 1984
3. ———. 2021. "A Sound Interpretation of Leśniewski's Epsilon in Modal Logic KTB." *Bulletin of the Section of Logic* no. 56:455-463.
"One motive from which I wrote [9] and [10] is that I wished to understand Leśniewski's epsilon ε on the basis of my recognition that Leśniewski's epsilon would be a variant of truth-functional equivalence ≡· Namely, my original approach to the interpretation of ε was to express the deflection of ε from = in terms of Kripke models. Another (hidden) motive of rnine for $I^{M\ is}$o interpret L_1 in intuitionistic logic and bi-modal logic. It is well-known that Leśniewski's epsilon can be interpreted by the Russellian-type
definite descricription in dassical first-order predicate logic with equality (see [12]). Takano (18] proposed a natural set-theoretic interpretation for the epsilon. To repeat, I do not deny the interpretation using the Russellian type definite description and a set-theoretic one. I wish to obtain another interpretation of Leśniewski 's epsilon having a more propositional character." (p. 460)
References
[9) T. Inoue, *Partial interpretation of Leśniewski's epsilon in modal and intensional logics* (abstract}, The Bulletin of Symbolic Logic, vol. l (1995), pp. 95-96.
[10] T . Inoue, *Partial interpretations of Leśniewski 's epsilon in von Wright-type deontic logics and provability logics*, Bulletin of the Section of Logic, vol. 24(4) (1995), pp. 223-233.
(12] A. Ishimoto, *A propositional fragment of Leśniewski's ontology*, Studia Logica, vol. 36 (1977), pp. 285-299.
(18] M. Takano, *A semantical investigation into Leśniewski's axiom of his ontology*, Studia Logica, vol. 44 (1985), pp. 71-77.
4. ———. 2022. "On Blass Translation for Lesniewski's Propositional Ontology and Modal Logics." *Studia Logica* no. 110:265-289.

Abstract: "In this paper, we shall give another proof of the faithfulness of Blass translation (for short, B-translation) of the propositional fragment L_1 of Lesniewski's ontology in the modal logic **K** by *means of Hintikka formula*. And we extend the result to von Wright type deontic logics, i.e., ten Smiley-Hanson systems of monadic deontic logic. As a result of observing the proofs we shall give general theorems on the faithfulness of B-translation with respect to normal modal logics complete to certain sets of well-known accessibility relations with a restriction that transitivity and symmetry are not set at the same time.
As an application of the theorems, for example, B-translation is faithful for the provability logic **PrL** (= **GL**), that is, K +□(□φ⊃φ)⊃□φ. The faithfulness also holds for normal modal logics, e.g., **KD, K4, KD4, KB**. We shall conclude this paper with the section of some open problems and conjectures."

5. ———. 2024. Nontrivial single axiom-schemata and their quasi-nontriviality of Leśniewski-Ishimoto's propositional ontology L_1.
Preprint Septemper 15, 2024 (The 4th version).
Abstract: "On March 8, 1995, was found the following nontrivial single axiom-schemacharacteristic of Leśniewski-Ishimoto's propositional ontology L_1 (Inoué [4]).
(A_{M8}) ∈ab ∧ ∈cd. ⊃ .∈aa ∧ ϙcc ∧ (∈bc ⊃ .∈ad ∧ ∈ba).
In this paper, we shall present the progress about the above axiom-schema from 1995 and conjectures about it. Here we shall give two criteria nontiriviality and quasi-nontriviality in order to distinguish two axiom-schemata. As main results, among others, in §6 - §8, we shall give the simplified axiom-schemata (A_{S1}), (A_{S2}) and (A_{S3N}) based on (A_{M8}), their nontriviality and quasi-nontriviality."
References
[4] Takao Inoué, A single axiom-schema of March 8th, *Bulletin of the Section of Logic* (Łódź, Poland), Vol. 24 (1995), p. 115.

6. Ishimoto, Arata. 1977. "A Propositional Fragment of Leśniewski's Ontology." *Studia Logica* no. 36:285-299.
Abstract: "In spite of a number of expository works Leśniewski's ontology seems to remain unfamiliar in the contemporary logico-philosophical scene.
Among munerous attempts made so far with a view to making this unfamiliar system more familiar and less puzzling there is Prior's [5], in which the author proposes to interpret Leśniewski's ontology as a broadly Russellian theory of classes deprived of the entities of the lowest type, namely, of individuals.
The purpose of the present paper is to pursue the attempt thus initiated by Prior in the above cited paper. More specifically, it will be proveds among others that a propositional fragment of Leśniewski's (elementary) ontology represents the broadly Russellian theory of classes with no bound class variables and without any occurrences of free individual variables. This will be established through an embedding of the said fragment into first-order predicate logic with equality by way of a translation suggested by Prior. (For Prior's suggestion refer also to Sagal [6], which offers a criticism of such an attempt.)"
References
[5] A. N. Prior, *Existence in Leśniewski and Russell*. Foral Systems and Recursive Functions, Amsterdam, 1963.
[6] P. Sagal, *On how best to make sense of Leśniewski's ontology*, Notre Dame Journal of Formal Logic, Vol. XIV, 1973.

7. ———. 1982. "A Lesniewskian version of Montague grammar." In *COLING '82: Proceedings of the 9th conference on Computational linguistics - Volume 1*, edited by Horecký, Ján, 139-144. Prague: Academia Praha.
Abstract: "We shall be concerned in this paper with the logical analysis of natural language on the basis of Leśniewski's ontology, which is a logical system without type-distinction between individuals and monadic predicates. This, it is believed, is

also one of the features of natural language, and use will be made of this feature for developing a fragment of natural language."

8. ———. 1997. "Logicism revisited in the propositional fragment of Leśniewski's ontology." In *Philosophy of Mathematics Today*, edited by Agazzi, Evandro and Darvas, György, 219-232. Dordrecht: Kluwer.
"Introduction
Although not so popular in the contemporary philosophical and logical scene, logicism dating from Frege and Russell was the first attempt to declare arithmetic as invariantly valid for any model involving an infinite number of individuals.
Now, the purpose of this paper is to locate such an invariance in a more elementary part of logic, namely, a tiny fragment of Leśniewski's ontology, and it will be shown that the fragment to be called Ll is invariant with respect to any model including or not including individual-like names. (The said propositional fragment Ll was introduced by Ishimoto [1977] and has subsequently been elaborated by Kobayashi-Ishimoto [1982], Inoue-Kobayashi-Ishimoto [forthcoming] and others.)" (p. 219)
References
Inoué, T., Kobayashi, M., and Ishimoto, A [forthcoming] Axiomatic rejection for the propositional fragment of Leśniewski's ontology.
Ishimoto, A [1977] A propositional fragment of Leśniewski's ontology, *Studia Logica*, 36, 285-299.
Kobayashi, M., and Ishimoto, A [1982] A propositional fragment of Leśniewski's ontology and its formulation by the tableau method, *Studia Logica*, 41,181-195.

9. Iwanuś, Boguslaw. 1969. "An extension of the traditional logic containing the elementary ontology and the algebra of classes." *Studia Logica* no. 25:97-135.
"In this paper the term "traditional logic" denotes the system of Aristotelian syllogistic - in the axiomatic approach presented by J. Łukasiewicz in the paper [4] - enriched by the nominal negation. Besides the laws of the square of opposition, the law of conversion and the categorical syllogisms there are the laws of obversion, contraposition and inversion of propositions in this system(1).
The paper deals with some axiomatic extension of traditional logic. Its main aim is arriving at a calculus of names in which all of the known laws of the categorical propositions are preserved and which would admit the introduction of notions corresponding semantically to the relation ε (... *is* ...) of St. Leśniewski's ontology, empty and universal sets and such operations of the algebra of classes as addition, multiplication and subtraction of sets." (p. 97)

10. ———. 1969. "Remarks about syllogistic with negative terms." *Studia Logica* no. 24:131-137.
"The present paper deals with the axiomatic systems of the traditional logic (syllogistic) of I. Thomas, A. Wedberg and C. A. Meredith (see [7]). Besides, a new axiomatic system of the traditional calculus of names is presented here. This system differs - as I know - from all hitherto constructed axiomatic systems of syllogistic. The systems of Thomas, Wedberg and Meredith are based on the two-valued propositional calculus. The Aristotelian "a" (all... are...) and the sign of nominal negation (i.e. negation of nominal arguments) " ' " are primitive terms of the first and second system. The sign of nominal negation and the functor "e", forming universal negative propositions, are primitive terms of Meredith's system. Each of these three systems has different set of axioms and primitive rules of inference but they are equivalent (see [7], p. 310)." (p. 131)
(...)
"As it has been remarked Wedberg's system contains all laws of the traditional calculus of names. However, Wedberg's set of axioms does not characterize sufficiently the constants of the Aristotelian syllogistic and the sign of nominal negation. In particular - as it has been shown by the example above presented - Wedberg's system does not exclude the interpretation of some categorical propositions which is

not in accordance with the sense of current language or with some known interpretationof these propositions. It seems that Wedberg's system and the equivalent systems of Thomas and Meredith should be strengthened especially by the axioms which exclude the above presented interpretation.
In this paper I attempt to formulate such axioms. The system presented here differs from Wedberg's system among others by the fact that it is based on the first order functional calculus without identity. The number of the axiomatic systems of syllogistic (with nominal negation and without such a negation) is considerable and therefore the construction of new axiomatic system of this kind should be justified." (p. 132)
(...)
"It can be also shown that the whole elementary ontology of S. Leśniewski is a fragment of the system S_2 enriched by the axiom stating that each non-empty set includes a unit subset. (5)
The detailed discussion of these questions, which lies beyond the limits of this paper, will be presented in my paper "Traditional logic, elementary ontology and the algebra of classes"." (p. 136)
(5) This axiom has nearly the same content as the expression α in the paper [10] of A. Tarski (p. 53).
References
[7] A. N. Prior, *Formal Logic*, Oxford 1962.
[10] A. Tarski, *Pojecie prawdy w jezykach nauk dedukcyjnych*, Warszawa1933.
Carew Arthur Meredith (1953). "Single axioms for the systems *(C,N*), (*C,0*), and (*A,N*) of the two-valued propositional calculus". *Journal of Computing Systems.* 1: 155–164.
Ivo Thomas (1952). "A new decision procedure for Aristotle's syllogistic". Mind,. 61: 564–566.
Anders Wedberg (1949). "The Aristotelian theory of classes". Ajatus (Helsinki), 15: 299–314.

11. Iwanus, Boguslaw. 1973. "On Leśniewski’s Elementary Ontology." *Studia Logica*:73-119.
Reprinted in Jan T. J. Srzednicki, V, F, Rickey (eds.), *Leśniewski's Systems: Ontology and Mereology*, The Hague: Martinus Nijhoff 1984, pp. 165-215.
"S. Lesniewtlki's calculus of names, often referred to as ontology, originated in 1920. This system like his other systems, mcreology and protothetics, was constructed with the aim on the one hand of bringing logic closer to the intuitions of natural language and on the other of searching for foundations for mathematics. Leśniewski's ontology, in spite of numerous intuitive and formal advantages and in spite of its considerable expressive potential, has bcen underrated and little known for a long time; although half a century has passed since the construction of the system no precise elaboration of it has yet appeared which takes account of its methodological aspect. This situation seems fundamentally to be due to the fact that Leśniewski published no paper presenting his system in more or less final form. The manuscripts that Lesniewtlki left and which covered the remIts of the years of his investigations into ontology were destroyed during world war II. Nor should one ignore the fact that most of the published papers, in which Leśniewski presented his system at the stage of formalisation, were written in a difficult and not easily intelligible style. Leśniewski's complicated symbols, although abounding in interesting ideat;, differ from the familiar logical and set-theoretic symbols and thus create an obstacle to the appreciation of his ideas. This explains the scarcity of exten:sive discussions of the ontology." (p. 165 of the reprint)

12. Jacquette, Dale. 2006. "Bochenski on Property Identity and the Refutation of Universals." *History and Philosophy of Logic* no. 35:293-316.
Abstract: "An argument against multiply instantiable universals is considered in neglected essays by Stanisław Leśniewski 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."

13. Jadacki, Jacek Jusliuz. 2020. *Stanisław Leśniewski: Genius of Logic*. Bydgoszcz (Poland): Oficyna Wydawnicza Epigram.

Translated from the Polish (2016) by Katarzyna Cullen.

"The book consists of five chapters. The focal point of the first chapter, "Life story — personality — milieu", is the calendarium. Preceded by Leśniewski's short (and probably only surviving) autobiography, it constitutes the most comprehensive chronological compilation of the events of his life thus far; it is mostly based on reliable sources — and sometimes directly on the relevant documents. A short description of Leśniewski's personality has been made on the basis of remarks scattered in texts by various authors. The list of students is far from complete.

(...)

3

Chapter two, "Official assessments", consists of requests and justifications attached to them, which concern the creation of the extraordinary chair for Leśniewski at the University of Warsaw and admitting him the title of ordinary professor. One of the opinions was probably expressed by Wacław Sierpiński (or possibly Stefan Mazurkiewicz?), the other — definitely by Łukasiewicz. Apart from historical value, they also have factual value, as they provide a substantial and competent description of Leśniewski's work, presented by the greatest contemporary experts, who N.B. have not ceased to be experts up today.

4

In chapter three, "In the eyes of the environment", there are texts in chronological order by the people who were in direct contact with Leśniewski at various points of his life.

(...)

5

A separate matter is the presence of texts by Leśniewski's three students from a later period in his life: Jerzy Słupecki, Czesław Lejewski and Henryk Hiż, included in chapter three.

They all wrote about their master on more than one occasion.

Słupecki (1904–1987) published two biographical notes about Leśniewski. Although they contain partially similar information, I decided to include both, since some details are depicted in a different light in them. Also, Lejewski (1913–2001) published two, much more extensive, biographical notes about Leśniewski, but they overlap to a large extent. Therefore, I am including one of them and have added a fragment which is significantly different in both versions. The first of Hiż's (1917–2006) texts was in a way commissioned by me (I write about it in more detail in the introduction to this text).

The second, although it partly overlaps with the first when it comes to information, is more extensive and contains many significant addenda to the first. This is why I decided to reprint both texts, as in the case of the biographical notes written by Słupecki. At the end of the chapter, I include short statements about Leśniewski found in the preserved legacy of one of his (quasi)mentors (Mścisław Wartenberg), colleagues (Kazimierz Ajdukiewicz, Leon Chwistek, Kazimierz Kuratowski, Czesław Znamierowski, and Roman Ingarden) or students (Bolesław Sobociński, Kazimierz Pasenkiewicz, nd Józef M. Bocheński).

6

In the fourth chapter, "From the correspondence", I primarily reprint twenty letters written by Leśniewski to Twardowski, as well as a few letters from Twardowski to Leśniewski: all that has survived from the ravages of history and which is kept in the Archive of the Polish Philosophical Society in Warsaw.

7

Chapter five, “Work — the most important achievements”, is a discussion of the two main aspects of Leśniewski’s genius, written by myself." (pp. 10-15)

14. Joray, Pierre. 2004. "Logicism in Leśniewski's Ontology." *Logica Trianguli* no. 6:3-20.
Abstract: "The paper presents a logicist construction of Peano’s arithmetic based on the framework of S. Lesniewski’s extensional calculus of names (Ontology). The construction is shown to have three main advantages compared to *Principia Mathematica*’s classical solution. First, cardinality is defined without the use of classes or sets (even as convenient symbols). Secondly, the dependence of Peano’s axioms vis-à-vis the only non logical assumption (axiom of infinity) is clarified. At last, the use of Lesniewski’s definition rules shows that there is no need of an ad hoc reduction process of unpredicative functions to predicative ones (axiom of reducibility)."

15. ———. 2015. Teaching Leśniewski’s Protothetic with a Natural Deduction System. *arXiv.org (Cornell University Library)*: 1-8.
Abstract: "Protothetic is one of the most stimulating systems for propositional logic. Including quantifiers and an inference rule for definitions, it is a very interesting mean for the study of many questions of metalogic. Unfortunately, it only exists in an axiomatic version, far too complicated and unusual to be easily understood by nowadays students in logic. In this paper, we present a system which is a natural deduction (in Fitch-Jaśkowski’s style) version of protothetic. According to us, this system is adequate for teaching Leśniewski’s logic to students accustomed to natural deduction."

16. ———. 2022. "Definition and Inference in Leśniewski’s Logic." In *Logic in Question: Talks from the Annual Sorbonne Logic Workshop (2011–2019)*, edited by Béziau, Jean-Yves , Desclés, Jean-Pierre, Moktefi, Amirouche and Pascu, Anca Christine, 245-258. Cham (Switzerland): Birkhäuser.
Abstract: "Since Whitehead and Russell’s *Principia Mathematica*, explicit definitions are usually considered to be logically neutral. In this paper, we explore those explicit definitions which were called c*reative* by the members of the Warsaw School.We explain why a definition can be necessary for the proofs of certain results in a formal system and why the eliminability of a definition does not imply its logical neutrality. For this purpose, we explore certain important but often neglected results about definitions established by Leśniewski, Łukasiewicz, and Tarski in the 1920s."

17. Kearns, John. 1967. "The Contribution of Leśniewski." *Notre Dame Journal of Formal Logic* no. 8:61-93.
"The present paper aims at giving an account of the logical work of Stanisław Leśniewski. Many other papers, as well as a book, are available, which treat Leśniewski and his work. However, I feel that another paper is called for. None of the articles presently available gives a satisfactory account of what Leśniewski did and why he did it. And the book, T*he Logical Systems of Leśniewski,* by E. C. Luschei, which is a complete
account of certain aspects of Leśniewski's work, does not make it easy for a person who knows little or nothing about Leśniewski to appreciate Leśniewski's work. The present paper attempts to give a brief, sympathetic, and relatively complete account of Leśniewski's work. What Leśniewski did and his reasons for doing it are both interesting and important—important enough to justify still another paper these many years after his death." (p. 61)

18. ———. 1969. "Two views of variables." *Notre Dame Journal of Formal Logic* no. 10:163-180.
"This paper has been prompted by the article "Logic and Existence," by Czesiaw Lejewski, which appeared in the British Journal for the Philosophy of Science 5 (1954). In his article, Dr. Lejewski has considered how
to give a logical analysis of statements where we say that something does or does not exist." (p. 163)

(...)
"I feel that one can distinguish two fundamentally different ways of regarding variables—I will call these two views of variables. The first view I call the Russell-Quine view; the second is the Frege-Leśniewski view
(these will be abbreviated as R-Q and F-L, respectively).4 These two are not the only possible views, but I feel that they are the two basic views; other views will be variants of one or the other, or perhaps combinations of the two." (p. 165)
(4) I will not try to make any historical points about either Russell or Frege. In discussing formal systems and formalized languages, each of these men have made statements which suggest the views to which I have attached their names. It may well be that on other occasions they have made statements inconsistent with these views. With respect to Frege, for example, if one takes the account given by Professor Church in the introduction to *Introduction to Mathematical Logic* as a natural development of Frege's own view, then the considered Fregian view of variables is distinct from both the Russell-Quine and the Frege-Leśniewski views.

19. ———. 2006. "An elementary system of Ontology." In *The Lvov-Warsaw School - The New Generation*, edited by Jadacki, Jacek and Paśniczek, Jacek, 87-112. Amsterdam: Rodopi.
"According to Sobocinski (1949), the Polish logician Stanisław Leśniewski devised his logical system Ontology in order to capture or express the notion of a distributive class. However, it isn't clear to me that Ontology involves any sort of classes. I think Lesniewski's system is best understood as a theory concerned with some features of common nouns – in contrast to first-order theories, which focus on referring expressions and predicates of individuals. In this paper I will explain my understanding by developing elementary systems of Ontology in which the semantic account makes no provision for distributive classes. After developing these systems of Ontology, I will discuss collections, which I think are close to what Leśniewski understood distributive classes to be.
As it turns out, the elementary systems of Ontology are not suited for making statements about collections. I will finish by sketching changes in one system of elementary Ontology which allow it to incorporate statements about collections." (p. 87)
References
Soboci?ski, B. (1949). L'Analyse de l'Antinomie russellienne par Ledniewski. M*ethodos* 1, 94-107, 220-228, 308-316; 2, 237-257.

20. Kielkopf, Charles S. 1977. "Quantifiers in Ontology." *Studia Logica* no. 36:301-307.
Abstract: "This paper is a reaction to G. Küng's and J. T. Canty's 'Substitutional Quantification and Lesniewskian quantifiers' *Theoria* 36 (1970), 165-182. I reject their arguments that quantifiers in Ontology cannot be referentially interpreted but I grant that there is what can be called objectual - referential interpretation of quantifiers and that because of the unrestricted quantification in Ontology the quantifiers in Ontology should not be given a so-called objectual-referential interpretation. I explain why I am in agreement with Küng and Canty's recommendation that Ontology's quantifiers not be substitutionally interpreted even if Leśniewski intended them to be so interpreted. A notion of an interpretation which is referential but yet which does not interpret ∃ as an assertor of existence of objects in a domain is developed. It is then shown that a first order version of Ontology is satisfied by those special kind of referential interpretations which read ∃ as 'Something' as opposed to 'Something existing'."

21. Kobayashi, Mitsunori, and Ishimoto, Arata. 1982. "A Propositional Fragment of Leśniewski's ontology and its Formulation by the Tableau Method." *Studia Logica* no. 41:181-195.
"In Ishimoto [2] there was proposed a propositional or quantifier-free subsystem of Leśniewski's ontology and it was proved, among other things, that the fragment can

be embedded, via a translation, in first-order predicate logic with equality. The purpose of this paper is to demonstrate this embedding theorem more constructively by means of the tableau method." (p. 181)
References
[2] A. Ishimoto, A propositional fragment of Lesnieski's ontology, *Studia Logica* XXXVI (1977), lop. 286-299.

22. Kotarbiński, Tadeusz. 1966. *Gnosiology: The Scientific Approach to the Theory of Knowledge*. Oxford: Pergamon Press.
Original Polish edition 1929; second revised edition 1961.
Translated from the Polish by Olgierd Wojtasiewicz; translation edited by G. Bidwell and C. Pinder.
Part III: Elements of Formal Logic, Chater III: The logical relationships between sentences as dependent on the internal structure of such sentences. Moderne calculus of terms, pp. 190-211.
"Pursuant to these introductory remarks, we shall expound elements of the calculus of terms in principle after Lesniewski's system. That author introduces only one axiom of the calculus of terms, and in that axiom there is only one primitive term—namely, the word "is" used as the copula between the subject and the subjective complement." (p. 190)

23. Kowalski, James George. 1977. "Leśniewski's ontology extended with the axiom of choice." *Notre Dame Journal of Formal Logic* no. 18:1-78.
"Introduction This dissertation deals with the Axiom of Choice in the field of Leśniewski's Ontology. Ontology, a theory of pure logic structured along the lines of a logical type theory, was developed by Stanisïaw Leśniewski (1886-1939) as a result of his own intensive analysis of the logical paradoxes and his dissatisfaction with the work of Russell and White head in *Principía Mathematica* [34] and was intended to provide a secure and intuitively acceptable logical foundation for the formal development
of mathematics."
(...)
"In this dissertation we will show, first, that certain principles known to be equivalent to the Axiom of Choice in the field of Set Theory are also equivalent in Ontology. In particular we show the equivalence of the Axiom of Choice, the Kuratowski-Zorn Lemma, and the Well Ordering Principle though it will be noted that the sense of this equivalence in Ontology is analogous to, but not identical with, the sense of their equivalence in Set Theory. Second, since Ontology's type theoretical structure prevents the addition of the Axiom of Choice as a single formula, but requires the addition of a spectrum of formulas, we give a precise syntactical description of the conditions these formulas must meet. More specifically we provide a modification to the Rule of Ontology which will insure that the Axiom of Choice is available for each semantic category (logical type) expressible in Ontology." (p. 2)
References
[34] Whitehead, A. N., and B. Russell, Principia Mathematica, vol. I-III (second edition), Cambridge University Press, Cambridge (1963).

24. Kruszewski, Zygmunt. 1984. "Ontology without Axioms (1925)." In *S. Leśniewski's Systems: Ontology and Mereology*, edited by Srzednicki, Jan, Rickey, Frederick V. and Czelakowski, Janusz, 9-10. The Hague: Martinus Nijhoff.
Reprinted in Jan T. J. Srzednicki, V, F, Rickey (eds.), *Leśniewski's Systems: Ontology and Mereology*, The Hague: Martinus Nijhoff 1984, pp. 9-10.
"Editorial Note: This is an abstract of Kruszewski's lecture delivered at the meeting of the Warsaw Institute of Philosophy on December 20, 1924. The report was published by B. Gawecki in "Przegląd Filozoficzny", Vol. XXVIII (1925) in Polish. Translated by Ewa Jansen."
"The speaker defines all fundamental concepts of ontology and proves as theorems the axiom and all equivalences formulated as definitions in Leśniewski's ontology.

With respect to ontological definitions, i.e., definitions formulated by the use of the word "is" (e.g.: x is even = x is a natural number and x is divisible by 2), it is possible to give a general method by means of which equivalences of that sort are obtained straightforwardly given an appropriate logical definition." (p. 10)

25. Kulicki, Piotr. 2012. "An axiomatisation of a pure calculus of names." *Studia Logica* no. 100:921-946.
Abstract: "A calculus of names is a logical theory describing relations between names.
By a pure calculus of names we mean a quantifier-free formulation of such a theory, based on classical propositional calculus. An axiomatisation of a pure calculus of names is presented and its completeness is discussed. It is shown that the axiomatisation is complete in three different ways: with respect to a set theoretical model, with respect to Leśniewski's Ontology and in a sense defined with the use of axiomatic rejection. The independence of axioms is proved. A decision procedure based on syntactic transformations and models defined in the domain of only two members is defined."

26. Küng, Guido. 1977. "The meaning of quantifiers in the logic of Leśniewski." *Studia Logica* no. 26:309-322.
"Quine has claimed that Lesniewskian quantification is substitutional.
But this interpretation is incorrect (cf. Küng and Canty [16]). Actually Lesniewskian quantification constitutes a third possibility that lies between objectual (referential) quantification an4 substitutional quantification, and it overcomes the drawbacks of each of its better known alternatives: while objectual quantification is restricted because some names do not have objets and substitutional quantification is restricted because some objects do not have names, Lesniewskian quantification works both for empty names and for nameless objects. This is so because, as we shall see, the range of quantification is neither the set of objects nor the set of names but the set of extensions (i.e. of extensional meanings). And even empty names have an extension, and even nameless objects belong to extensions.
The formulas of substitutional and of Lesniewskian quantification belong to the object language, but their readings are in a certain sense metalingnlistic. For instance, according to Ruth Barcan Marcus '(3x)Fx' is to be read "Some substitution instance of 'Fx' is true" and correspondingly '(x)Fx' is to be read "Every substitution instance of 'Fx' is true" (cf [32] p. 252-253). How is that to be understood? We shall see that in an adequate reading" of those formulas names of expressions occur only in an "implicit" and not in an "explicit" way.
In my opinion the question of how to read quantified statements is of some consequence. The habit of giving merely model-theoretic interpretations and no intuitive paraphrases has tended to obscure some
subtle, but very important aspects of oblique speech. This can best be made clear by taking as a starting point some recent discussions concerning "saying that"." (p. 315, two notes omitted)
References
[16] G. Küng, J. T. Canty, Substitutional quantification and Lemiewskian quantifiers, *Theoria*, Vol. 36, 1970, pp. 165-182.
[32] R. B. Marcus, Interpreting quantification, *lnguiry*, Yol. 5 (1962), pp. 252-259.

27. ———. 1981. "Leśniewski’s systems." In *Dictionary of Logic as applied in the Study of Language: Concepts, Methods and Theories*, edited by Marciszewski, Witold, 168-177. The Hague: Martinus Nijhoff.
"Leśniewski's logic is composed of the three systems: protothetics, ontology and mereology, which correspond, very roughly speaking, to propositional logic ; predicate logic (with identity) and set theory; and the calculus of individuals." (p. 168)
(...)
"Protothetics

This most general of Leśniewski's three systems is the science of the proto-theses (the most primitive theses). It is a propositional logic that has equivalence as its only primitive term, but allows (unlike most of the usual propositional calculi) quantification with respect to sentences and even with respect to functors of any category.£ (p. 169)
(...)
"Ontology
Leśniewski's ontology, the science of the copula "is" (and in this sense, of being), must not be confused with ontology in the usual philosophical senses of the word. It is a system of the logic of names, built upon protothetics, with a new primitive term, the copula 'ε', and a new basic category, the category of names." (p. 170)
(...)
"Mereology
Mereology, the science of parts and wholes (from the Greek *meros:* part), presupposes both protothetic and ontology, but historically it was the first system developed by Leśniewski, for his main aim had been to overcome Russell's antinomy of clarifying the notion of class (cf. Sobocinski 49-50). The notion of a mereological "class", i.e. of a collective whole (a concrete "heap" composed of parts), is of all the explicata of the notion of class the one which is the most easy to understand. The notion of a distributive class is much more controversial. As we have seen, Leśniewski refused to accept such classes as objects and instead developed ontology, i.e. the logic of distributively referring names." (p. 174)
References
Sobocirlski, B.: L 'analyse de I'antinomie Russellienne par Leśniewski. *Methodos* 1: 94-107; 2: 237-·257, 1949-1950.

28. ———. 1983. "The Difficulty with the Well-formedness of Ontological Statements." *Topoi* no. 3:111-119.
Abstract: "When Russell argued for his ontological convictions, for instance that there are negative facts or that there are universals, he expressed himself in English. But Wittgenstein must have noticed that from the point of view of Russell's ideal language these ontological statements appear to be pseudo-propositions. He believed therefore that what these statements pretend to say, could not really be said but only shown. Carnap discovered a way out of this mutism: what in the material mode of speech of the object language looks like a pseudo-proposition can be translated into a perfectly meaningful proposition in the formal mode of speech (in the metalinguistic mode of speech of the logical syntax of language). But is this ascent into the metalanguage necessary? Taking advantage of Leśniewski's logical system there exists another way out- we can expand the number of categories of our ideal language. But Leśniewski's formulas raise another profound problem, the problem of "semantical muteness" (cf. W. G. Lycan 'Semantic Competence and Funny Functors' *Monist* 64 (1979), 209-222)."

29. Küng, Guido, and Canty, John Thomas. 1970. "Substitutional quantification and Leśniewskian quantifiers." *Theoria* no. 36:165-182.
"It has been suggested that Leśniewski's use of quantifiers is substitutional(1) and, related to this, that his system is nominalistic. In this paper we consider in what sense these claims are accurate. In particular, various theses in Leśniewski's system of ontology (and in extensions of that system) are considered, in order to determine an accurate interpretation of quantification which is applicable to Lesniewskian systems." (p. 165)
(1) W. V. Quine, "Ontological relativity," *The journal of philosophy*, vol. 65 (1968), pp. 185-212 (see p. 209), idem, "Existence and quantification," in J. Margolis, ed., *Fact and existence*, (Oxford: Blackwell, 1968) pp. 151-164 (see p. 159). J. T. Kearns, "The logical concept of existence," *Notre Dame journal of formal logic*, vol. 9 (1968), pp. 313-324; idem, "Two views of variables," *ibid*, vol. 10 (1969), pp. 163-180 (see p. 167).

30. Lambert, Karel, and Scharle, Thomas. 1967. "A translation theorem for two systems free logic." *Logique et Analyse* no. 10:328-341.
"During the past decade and a half philosopher-logicians on the westem side of the Atlantic have shown an increasing interest in languages which are free of existence assumptions (i) with respect to their terms and / or (ii) in the sense that their theorems are true in all domains including the empty one. On the western side of the Atlantic, logics free of existence assumptions in sense (i) are c,alled free logics; logics free of existence assumptions in both senses are called universally free logics. For the purposes of the present paper the distinctiion is not important. So we shall use the expression "free logic" to refer 1to languages satisfying (i) and perhaps (ii)." (p. 328)
(...)
"In the 1920's and 1930's, on the eastern side of the Atlantic, Leśniewski[10] developed a language for the foundations of mathematics which in part was concerned with eliminating the same existence assumptions. Within this tradition, Lejewski[9] quite recently has constructed a language, L4, whose first order fragment, L4', will concern us in this paper. This language departs in some important ways from the· languages mentioned earlier. First, the classical predicate logic is retained. Second, the sense of the quantifiers in L4' departs from that in the usual presentations of mathematical logic." (p. 329)
References
[9] Czeslaw Lejewski, "A theory of non-reflexive identity", Proceedings of the 6th Forschungsgesprach: Institut fur Wissenschaftstheorie, Salzburg, September: 1965.
[10) Eugene C. Luschei, *The logical systems of* Leśniewski, Amsterdam, 1962, pp. 321-323.

31. Le Blanc, Audoënus. 1985. "Investigations in Protothetic." *Notre Dame Journal of Formal Logic* no. 26:483-489.
Reprinted in Jan Srzednicki, Zbigniews Stachniak (eds.), *S. Leśniewski's Systems: Protothetic*, Dordrecht: Kluwer 1998, pp. 289-307.
"In this article I present some results of five years' research into Leśniewski's protothetic.(1) I outline deductions from the axiom A_n considerably shorter than those previously known (see Sobocinski, 1961a) and I derive the laws of implication from this axiom without using the rule of extensionality.(2) Since this paper can best be read in the light of articles by Professor Sobocinski published in this Journal (see Sobocinski, 1960, 1961a and 1961b),** I have largely adopted his conventions of symbolism (...)" (p. 289 of the reprint)
** [Ed. Note: Cf. paper VI in this volume.]
References
Sobocinski, B. (1960) 'On the Single Axioms of Protothetic. I, II, III' , *Notre Dame Jurnal of Formal Logic* I (1960), 52-73; II (1961), 111-126 and 129-148.

32. ———. 1985. "New Axioms for Mereology." *Notre Dame Journal of Formal Logic* no. 26:437-441.
"In this paper I shall present several new axioms and axiom systems for mereology with an account of their origin. I shall also outline a proof that the two most interesting of these are adequate sole axioms for mereology." (p. 437)

33. ———. 1991. *Leśniewski's Computative Protothetic*, University of Manchester.
Abstract: "The logician Stanisław Leśniewski devoted most of his academic life to the development of a system of foundations of mathematics, which consists of three deductive theories:
protothetic, ontology, and mereology. Protothetic is the most general of these theories, logically prior to the others; it has been described by its creator as a unique extension of the classical ‘theory of deduction’ or ‘propositional calculus’, though this theory differs from more usual versions in many respects. The ‘standard’ system of protothetic is developed by a rule of procedure corresponding to the traditional style of development incorporating substitution and detachment, but including directives for definition and extensionality.

Leśniewski also developed systems of protothetic whose rule of procedure does not contain directives for substitution or detachment, and whose style of development has been described as 'computative' or as involving 'automatic verification'. The directives may be said to resemble Peirce's zero/one verification method, though they are extended to allow verification and rejection of expressions containing variables in all semantic categories, and having various numbers of possible 'values'. Only an informal summary of Lesniewski's work on these systems survives.

This thesis examines computative protothetic historically, informally, and formally. It contains a set of directives for a system of computative protothetic which is as close as possible to the lost directives of Lesniewski's own systems."

34. Lejewski, Czeslaw. 1954. "Logic and Existence." *British Journal for the Philosophy of Science* no. 5:104-119.

Reprinted in Jan T. J. Srzednicki, V, F, Rickey (eds.), *Leśniewski's Systems: Ontology and Mereology*, The Hague: Martinus Nijhoff 1984, pp. 45-58.

"The meaning of 'exist(s)' can best be determined on the basis of the logic of noun-ex ressions constructed as a deductive system by Leśniewski .in Warsaw in 1920 and called by him 'Ontology'.(12) The original system of Leśniewski's Ontology is based on singular inclusion (a is b or in symbols a ε b) as the only primitive function. For various reasons, however, I prefer to continue my analysis of 'exist(s)' with reference to a system of Ontology based on ordinary inclusion, with I shall write in the following manner: I shall read it 'all a is b' or 'all a's are b's'. I prefer doing this because ordinary inclusion seems to be more intuitive to an English speaking reader than Leśniewski's singular inclusion. Thus for instance ordinary inclusion has recently been used by Woodger in his 'Science without Properties" (13) for the purpose of constructing a language whose general tendency approximates the tendencies embodied in Ontology." (pp. 57-58 of the reprint)

(12) See Leśniewski [1930].

(13) See Woodger [1952].

"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. 58 of the reprint)

(1) See J.t ukasiewicz 'The Principle of Individuation', *Proceedings of the Aristotelian Society Sup*. Vol. 27, London, 1953, 77 sq.

References

Leśniewski, Stanislav, [1930] t*Jber die Grundlagen der Ontologie*, Comptes rendus des seances de la Société des Sciences et des Lettres de Varsovie, Classe III, 23

Annee, 111-132, Warszawa.
Woodger, Josepgh H. [1952] Science without Properties, *The British Journal for the Philosophy of Science*, Vol. II, 193-217.

35. ———. 1954. "A Contribution to Leśniewski's mereology." *Roczniki Polskiego Towarzystwa Naukowego na Obczyźnie* no. 5:43-50.

36. ———. 1955. "A new axiom for mereology." *Polish Society of Arts and Sciences Abroad* no. 6:65-70.

37. ———. 1957. "Symposium: Proper Names. II." *Proceedings of the Aristotelian Society* no. Supplementary vol. 31:191-236.
[The first part was by Peter Frederick Strawson, pp. 191-228]
"In my contribution to the symposium I propose to follow Mr. Strawson's lead as regards the selecting of the main topics for the discussion but I shall try to approach the various problems with which he is concerned from a some- what different angle. The principal aim of Mr. Strawson's paper is, as he puts it himself, to find the rationale of the doctrine that particulars cannot be predicated and to arrive at an understanding of the distinction between reference and predication. I shall also deal with the doctrine but the questions connected with the semantical status of predicate-expressions will be discussed with greater accuracy than other problems." (p. 228)
(...)
"Not unlike Mr. Strawson's paper, the present discussion was primarily devoted to the problem of the distinction between subject-expressions (or arguments) and predicate expressions (or functors). In the Method of Individual Names I tried to show how a syntactical and semantical theory could be built up, starting with the concepts of truth and falsehood and the semantical relation of designating.
In the Generalized Method [of Leśniewski] I made use of a more comprehensive relation of naming. With the aid of this semantical equipment other concepts required for the semantical analysis of the constituent parts of simple propositions were introduced. In particular it was shown that within the framework of both methods functors which correspond to predicate-expressions could be classified into unshared, shared, and fictitious in analogy to a similar classification of names. The characteristic feature of this classification of functors consisted in complete avoidance of any reference to entities other than individuals. On an example of a certain type of problem propositions, I tried to point out that in ordinary usage ' pseudo-names ' are used to stand for functors. It is the wide use of 'pseudo-names', just in this sense, that accounts for the generally accepted semantical theories which presuppose the existence of entities other than individuals. In the final sections of the paper I suggested a tentative definition of ' proper names ' and then I discussed some of the expressions of ordinary language which seem to satisfy the requirements of the definition." (p. 255)

38. ———. 1958. "On implicational definitions." *Studia Logica* no. 8:189-206.
1. *Fragmentary and full systems of the Calculus of Propositions.*The Implicational Calculus of Propositions, i. e. the Propositional Calculus based on implication as a sole primitive function is a fragmentary calculus because it contains implicational theses only. In other words it contains those and only those theses of the Full Propositional Calculus in which the functor of implication occurs as the only constant term."
(...)
"It is with the aid of a rule of definition together with the other two rules of inference that we derive theses with occurrences of other proposition-forming functors for propositional arguments. Only a calculus which in virtue of its rules of inference contains all such theses, truly deserves the name of Full Propositional Calculus."
"In this paper I propose to formulate a quite general rule which extends a system of the ordinary Implicational Calculus into a system of the Full Propositional Calculus

in the sense just explained. This new rule I shall call the rule of 'implicational definitions'.
2. *Leśniewski's views concerning definitions.*As regards definitions in general, the majority of contemporary logicians seem to share the views of A. N. Whitehead and B. Russell expressed on the subject in the *Principia Mathematica*(2)
These views may be summarized as follows:
(a) Definitions are not propositions. They are neither true nor false.
(b) Definitions do not belong to the system and theoretically are superfluous.
(c) Definitions are concerned with the symbols, not with what they symbolize.
(d) Definitions are mere typographical conveniences.
(e) The sign '= ... Df', which is used to express a definition, is not equivalent to any of the functors of the Full Propositional Calculus.
(f) The definiendum has the same meaning as the definiens.
A different view on the nature of definitions was held by S. Lwaniewski of the Warsaw School. Leniewski regards'definitions as theses of the system.
In this respect they do not differ either from the axioms or from theorems, i. e. from the theses added to the system on the basis of the rule of substitution or the rule of detachment. Once definitions have been accepted as theses of the system, it becomes necessary to consider them as true propositions in the same sense in which axioms are true.(3)" (pp. 189-190)
(2) See Whitehead-Russell (22) p. 11 and p. 94.
(3) In connexion with the definitions in the *Prindpia* and in Leśniewski's system see Łukasiewicz (13) pp. 28 f.
References
(13) J. Łukasiewicz: On Variable Functors of Propositional Arguments, *Proceedings of The Royal Irish Academy,* Section A, No 2, 54 (1951), Dublin.
(22) A. N. Whiteheasd and B. Russell: *Principia Mathematica*, Vol. 1, Cambridge 1935

39. ———. 1958. "On Leśniewski's Ontology." *Ratio* no. 1:150-176.
Reprinted in Jan T. J. Srzednicki, V, F, Rickey (eds.), *Leśniewski's Systems: Ontology and Mereology*, The Hague: Martinus Nijhoff 1984, pp. 123-148.
"Leśniewski's criticism of 'pure' formalism shows that he had never ceased to be a philosopher. There are many 'pure' formalists among logicians and mathematicians but there are few 'pure' formalists among philosophers. For philosophers are, for the most part, preoccupied with the problem of meaning. Whether they deal with expressions of ordinary language or with logical formillae, they are concerned with interpretation rather than with formal elegance alone. The doctrine of 'pure' formalists could erhaps be condensed into the following motto: formalization before interpretation. Leśniewski's principle would read in the reverse.
For the most part Leśniewski's published papers present his theories at the stage of formalization with the problems of interpretation either left out or touched upon in an incidental manner. This makes the reading of these papers extremely difficillt. It is the aim of the present contribution to bring the problems of interpretation to e foreground and by so doing serve as an informal introduction to one of the principal theories conceived by Leśniewski." (p. 124 of the reprint)
(...)
"Although Ontology was the subject of several university courses given by I.esniewski during the twenty years of his academic career in Warsaw until his death in 1939, there have been few papers published on it. The fundamental and most authoritative source is Leśniewski [1930]. It is an extremely condensed and difficult paper as it was meant to be a sort of 'identity card' of Ontology and not its 'lengthy biography'.
It gives an axiom of Ontology and, with reference to Leśniewski [1929a, pp. 59-67], it also gives the rules of inference for Ontology stated here with a precision which has not since been improved upon. In addition, the paper contains a brief account of the researches of Leśniewski and his collaborators into the axiomatic foundations of Ontology.(7)

There are two more papers by Leśniewski on special problems theoretically belonging to Ontology. They are Leśniewski [1929a] and Leśniewski [1929b[. These papers are also worth mentioning for the fact that they contain some of the neatest examples of Leśniewski's method of setting out his deductions.
Finally, there is Leśniewski [1927-1931, Ch. XI], where he gives his analysis of the meaning of the primitive constant of Ontology as used in Leśniewski [1930]. Naturally enough this analysis is made from the point of view of the Polish language.
This is all that Leśniewski himself ever published on his Ontology.
His copious notes and manuscripts, which contained a wealth of new results and which were to have been prepared for publication by Sobocinski, were destroyed in 1944 during the war." (pp. 125-126 of the reprint)
References
[1927-1931] 0 podstawach matematyki (On the Foundations of Mathematics) Przegląd Filozoficzny, Vol. XXX (1927), 164-206; Vol. XXXI (1928), 261-291; Vol. XXXII (1929), 60-101; Vol. XXXIII (1930), 77-105; Vol. XXXIV (1931), 142-170. (Polish). (Ellglish translation Leśniewski 1983])
[1929a] *Gründzuge eines neuen Systems der Grundlagen der Mathematik,* Fundamenta Mathematicae, Vol. XIV, 1-81. (English translation in Leśniewski 1984])
[1929b] *tJber Funktionen, deren Felder Abelsche Gruppen in Bezug auf diese Funktionen sind*, Fundamenta Mathematicae, Vol. XIV, 242-251. (English translation in Leśniewski 1984])
[1930] *tJber die Grundlagen der Ontologie*, Comptes rendus des seances de la Société des Sciences et des Lettres de Varsovie, Classe III, 23 Annee, 111-132, Warszawa. (English translation in Leśniewski 1984])
[1931] t*Jber Definitionen in der sogenannten Theorie der Deduktion*, Comptes rendus des seances de la Société des Sciences et des Lettres de Varsovie, Classe III, 24 Annee, 289-309, Warszawa. (English translation in Leśniewski 1984]) and in McCall [1967], 170-187)
[1983] *On the Foundations of Mathematics,* Topoi, Vol. II, No.1, 7-52. (This is the abridged English translation by Vito F. Sinisi of Leśniewski [1927-1931].)
[1984] *Collected Works of Stanisław* Leśniewski (edited by Jan Srzednicki, Stanisław J. Surma, and Dene I. Barnett), Synthese Library, D. Reidel Publishing Co./PWN, Dordrecht-BostonjWarszawa, to appear.[1992]

40. ———. 1960. "A re-examination of the russellian theory of descriptions." *Philosophy* no. 35:14-29.

"The theory of descriptions occupies a very prominent place in Russell's system of logic and indeed in his system of philosophy. Since the publication of the now classical paper "On Denoting" in *Mind* for 1905 the theory had been incorporated into *Principia Mathematica*, the first volume of which appeared in 1910. In 1918 Russell discussed descriptions in his lectures on the *Philosophy of Logical Atomism*, which subsequently were published in *The Monist* for 1919. A very lucid exposition of the main tenets of the doctrine is to be found in the *Introduction to Mathematical Philosophy* dating from the same year. Epistemological aspects of the theory of descriptions are examined in "Knowledge by Acquaintance and Knowledge by Description", in the *Proceedings of the Aristotelian Society* for 1910-11, and also in Chapter V of The *Problems of Philosophy*, first published in 1912.(1) It is not an exaggeration to say that the theory of descriptions has become part and parcel of modern logic. Naturally, it has been criticized on different accounts, but the various arguments of the critics seem to have failed to move Russell from the position he took over fifty years ago. I propose to re-examine Russell's theory of descriptions because it seems to me that it raises a few interesting problems which appear to have escaped the notice of its originator, let alone his critics." (p. 14)
(1) The papers "On Denoting" and "The Philosophy of Logical Atomism" are now available in B. Russell, *Logic and Knowledge*, London, 1956.

41. ———. 1963. "A note on a problem concerning the axiomatic foundations of mereology." *Notre Dame Journal of Formal Logic* no. 4:135-139.
"In 1948 Sobociński established that mereology could be based on [a] single axiom. (...)
!Since then a number of single axioms for other mereological constant terms have been found.(2)
(...)
In I960 I found a thesis, a little longer than U, which could be used as a single axiom of mereology and which involved quantification over nominal variables only." (p. 135)
(2) See C. Lejewski, A Contribution to Leśniewski's Mereology', *Polish Society of Arts and Sciences Abroad, Yearbook for 1954-55*, London 1955, pp. 43-50, C. Lejewski, 'A New Axiom of Mereology', i*bid., Yearbook for 1955-56*, London 1956, pp. 65-70, and B. Sobociński, On Well Constructed Axiom Systems', *ibid.,* pp. 54-65.

42. ———. 1963. "Aristotle's syllogistics and its extensions." *Synthese* no. 15:125-154.
"The task I have set myself in this paper can be described as bridging the gap between Aristotle's syllogistic and Leśniewski's ontology. I propose to suggest a number of successive extensions of syllogistic culminating in a system of what may be regarded as basic ontology. In this way I hope to throw new light on the significance of the Aristotelian logic. At the same time I hope to add a little to the understanding of Leśniewski's ontology, which interestingly enough was conceived by its originator as a modernised continuation of the ancient and medieval tradition. (1)" (p. 125)
(1) For a modern treatment of Aristotle's syllogistic see Łukasiewicz [8]; a condensed but authoritative presentation of ontology is to be found in Leśniewski [6]; an elementary discussion of ontology and some of its problems is contained in Kotarbiński [2], Sobocinski [12], Sobocinski (13], Slupccki (11], and Lejewski [4].
References
(2] Kotarbiński, T., *Elementy teorji poznania, logiki formalnej i metodologji nauk* (Elements of Epistemology, Formal Logic and Methodology), Lwów, 1929.
[4] Lejewski, C., 'On Leśniewski's Ontology', *Ratio* 1 (1957-1958).
[6] Leśniewski S., 'Über die Grundlagen der Ontologie', *Comptes rendus des seances de la Societé des Sciences et des Lettres de Varsovie,* Classe III, 18 (1930).
[8] Łukasiewicz, J., *Aristotle's Syllogistic*, Oxford, 1951; 2nd edition: Oxford, 1957.
[11] Slupecki, J., 'S. Leśniewski's Calculus of Names', *Studia Logica* 3 (1955).
[12] Sobocinski, B., 'O kolejnych uproszczeniach aksjomatyki "ontologji" prof. St.Lesniewskiego' (On Successive Simplifications of the Axiom-system of Leśniewski's 'Ontology'), *Ksifga Pamiqtkowa - Fragmenty* Filozoficzne, Warszawa 1934.
[13] Sobocinski, B., 'L'analyse de l'antinomie Russellienne par Leśniewski', *Methodos* 1 (1949) and 2 (1950).

43. ———. 1967. "A single axiom for the mereological notion of proper part." *Notre Dame Journal of Formal Logic* no. 4:279-285.
"The mereological notion of proper part was used by Leśniewski as a primitive, i.e., undefined, notion in his first system of mereology constructed in 1915.(1)" (p. 279)
(...)
"In the present paper I propose to develop a system of mereology,—I will call it System C[gothic],—whose axiomatic basis consists of [a] single axiom. (p. 280)

44. ———. 1969. "Consistency of Leśniewski's Mereology." *Journal of Symbolic Logic* no. 34:321-328.
Reprinted in Jan T. J. Srzednicki, V, F, Rickey (eds.), *Leśniewski's Systems: Ontology and Mereology*, The Hague: Martinus Nijhoff 1984, pp. 232-238.
"According to Sobocinski's recollection, the consistency of Mereology was proved by Leśniewski by means of an appropriate interpretation within the framework of the theory of real numbers. His proof was never published, but in a recent paper R.

E. Clay has succeeded in reconstructing a version of it.(1) Clay's result amounts to showing that if Leśniewski's Ontology expanded by the addition of the axioms for the real numbers is consistent then Mereology is consistent. Without casting any doubts on the validity of the proof one can hardly fail to note that here we have a case where the consistency of a conceptually simple theory is made to depend on the consistency of a theory which from the point of view of intuition is far from being obvious. What we would like to be in a position to do is to prove the consistency of Mereology relative to a theory which is more obvious than Mereology, or, preferably, relative to a theory which is, in fact, a much weaker subsystem of Mereology. It is with this methodological principle in mind that I propose to outline, in what follows, a new proof of the consistency of the theory under consideration." (p. 232 of the reprint)
(1) See R. E. Clay, Consistency of Leśniewski's mereology relative to real numalber, this Journal, vol. 33 (1968), pp. 251-257.

45. ———. 1970. "Quantification and ontological commitment." In *Physics, Logic, andHistory: Based on the First International Colloquium held at the University of Denver, .May 16-20, 1966*, edited by Yourgrau, Wolfgang and D., Breck. Allen, 173-181. New York: Plenum Press.
Discussion between Quine, Lejewski, Yourgrau, Kaplan, Mercier, Hintikka, Popper, pp. 181-190.
"In his review of a paper by Ajdukiewicz [1], Quine makes the following comments on Leśniewski's version of the membership connective 'ε':
(...)
If quantificatlon as Leśniewski used it did not commit hirn squarely to a theory of classes as abstract entities, then the present reviewer is at a loss to imagine wherein such commitment even on the part of a professing Platonist can consist [2].
I quote this passage because the last sentence in it poses two problems which I want to make central to the present enquiry. First, is quantification as Leśniewski used it, and as his followers continue to use it, incompatible with the renunciation of abstract entities? Second, in what way can a professing Platonist give expression to his ontological commitment?
The language of Ldniewski's logic differs from the language of the traditional theory of quantification (with identity) in several respects.
But as it happens, we need not go into details because we can solve our problem by first solving it within a more familiar context." (pp. 173-174)
(...)
"To sum up. In the traditional theory of quantification the variables of the first order are correlated with arealm of entities thought of as their values; the variables of a higher order, whether quantified or not, presuppose no additional realm of entities, and quantifying propositional variables within the logic of propositions does not commit us to entertaining the existence of any entities at all." (p. 177)
"Here I propose to bring to an end my examination of the two problems arising from Quine's remarks on Leśniewski's logic of 'ε'. In conclusion I wish to mention a third problem, which is closely connected with the topic under discussion but exceeds the boundaries of the present paper. The problem is this: how can we give expression to what might be called a negative ontological commitment? How can we say, without contradicting ourselves, that there are no abstract entities? How can we renounce, without contradicting ourselves, the universe of classes or the uni verse of numbers, or the universe of any other sort of abstract entities?" (p. 181)
(1) I. K. Ajdukiewicz, "On the Notion of Existence," *Studia Philosophica* 4 (1949/1950), published in 1951, pp. 7-22.
(2) W. Quine, *J. Symholic Logic* XVII, 141.

46. ———. 1973. "A Contribution to the Study of Extended Mereologies." *Notre Dame Journal of Formal Logic* no. 14:55-67.
"By *extended mereologies* I understand *atomistic mereology* and *atomless mereology*. Either is an extension of *general mereology*, which is a theory of part-whole relations, first established by Leśniewski about sixty years ago.(1) In

presenting what follows, I will assume that the reader will be familiar with mereological vocabulary and also with a few elementary theses of general mereology."

(1) See Leśniewski [6] and Leśniewski [7]; for a general introduction to mereology see Sobociŋski [9] and Luschei [8],

References

[6] Leśniewski, S., "Podstawy ogólnej teoryi mnogosci. I," (The Foundations of a General Theory of Manifolds). *Prace Polskiego Koía Naukσwegow Moskwie*, Sekcya matematyczno-przyrodnicza, No. 2, Moskwa (1916).

[7] Leśniewski, S., "O podstawach matematyki" (On the Foundations of Mathematics), *Przegląd Filozoficzny* (Philosophical Review), vol. 30 (1927), pp. 164-206; vol. 31 (1928), pp. 261-301; vol. 32 (1929), pp. 60-101; vol. 33 (1930), pp. 75-105 and 142-170.

[8] Luschei, E. C, *The Logical Systems of* Leśniewski, Amsterdam (1962).

[9] Sobociŋski, B., "Studies in Leśniewski's Mereology," V Rocznik Polskiego Towarzystwa Naukowego na Obczyznie (The 5th Yearbook of the Polish Society of Arts and Sciences Abroad) (1954-55), pp. 34-43.

47. ———. 1974. "A system of logic for bicategorial ontology." *Journal of Philosophical Logic* no. 3:265-283.

"However, it would seem to be appropriate to make it clear at this stage that the problem to be dealt with in the present paper is not in fact ontological. I shall not be concerned with propounding arguments either for or against a unicategorial ontology, according to which there is only one kind of things, or a bicategorial ontology, which holds that there are two kinds of things, either kind enjoying a different mode of existence, or any other multicategorial ontology. And although in the end my own ontological preferences will probably fail to remain unnoticed, my primary task is that of a logician. On the assumption that there are ontologists who advocate a bicategorial ontology and also those who are anxious to refute it, I propose to suggest a system of logic acceptable to both sides of the dispute. I have chosen bicategorial ontology as the theme of my study because of all multicategorial ontologies it is the simplest. If we can solve, to our satisfaction, some of the logical problems connected with bicategorial ontology then we may hope to be able to use our results as a guide-line for approaching, if need be, the logical problems that any other multicategorial ontology may raise. And, speaking generally, I find this sort of enquiry of some significance for two reasons. First, philosophers have been talking about various categories of being ever since Aristotle. Indeed, the idea that there are various modes of existence should, perhaps, be traced back to Plato or even back to the Pythagoreans. When we turn to more recent developments, Russell’s theory of logical types in its ontological version is the case in point.

Secondly, the views put forward by some logicians as to how one gives expression to one’s commitment to a multicategorial ontology appear to me to be totally unacceptable.(2)" (pp. 265-266)

(2) For criticism of Quine’s doctrine of ontological commitment see. my ‘The Problem of Ontological Commitment’, *Fragmenty Filozoficzne* (Third Series), PWN, Warszawa 1967, pp. 147-164, and ‘Quantification and Ontological Commitment’, *Physics, Logic and History* (eds. W. Yourgrau and A. D. Breck), Plenum Press, New York 1970, pp. 173-181.

48. ———. 1977. "Systems of Leśniewski's Ontology with the Functor of Weak inclusion as the Only Primitive Term." *Studia Logica* no. 36:323-349.

"The original system of Ontology, constructed by Leśniewski in 1920, is based on the functor of singular inclusion as the only primitive ontological term. As regards its meaning, the functor of singular inclusion approximates the meaning of the copula 'is'. In natural languages without indefinite articles, in Latin or in Polish for instance, the approximation appears to be closer than is the case in the languages in which the indefifinite articles have a role to play. It is, therefore, not surprising that English or German speaking logicians find Leśniewski's logical language offending

their linguistic intuitions, and treat his Ontology, and the theories which presuppose it, with a certain amount of suspicion. They might have been less mistrustful of Ontology, had Leśniewski based it on a different primitive term. It is quite likely that the functor of weak inclusion would prove to be more acceptable at least to those logicians who had been acquainted with the researches of Boole and Schröder" (p. 323)

49. ———. 1978. "A Note Concerning the Notion of Mereological Class." *Notre Dame Journal of Formal Logic* no. 19:251-263.
"In mereology we have a number of equivalences which in various ways characterize the notion of mereological class. Some of these equivalences have been used, in some systems of mereology, as definitions while others have been proved in these systems as theorems." (p. 251)
For a general introduction to mereology see Luschei [6], Sobociἠski [7] and Sobociἠski [8] .
References
[6] Luschei, E. C, *The Logical Systems of* Leśniewski, Amsterdam (1962).
[7] Sobociἠski, B., "L'analyse de Γantinomie Russellienne par Leśniewski," *Methodos*, vol. 1 (1949), pp. 94-107, 220-228, 308-316, and vol. 2 (1950), pp. 237-257.
[8] Sobociἠski, B., "Studies in Leśniewski's mereology," *V Rocznik Polskiego Towarzystwa Naukowego na Obczyznie,* London (1954-1955), pp. 34-43.

50. ———. 1979. "On the dramatic stage in the development of Kotarbinski's pansomatism." In *Ontologie und Logik. Ontology and Logic.*, edited by Weingartner, Paul and Morscher, Edgar, 197-214. Berlin: Duncker & Humblot.
Proceedings of an International Colloquium (Salzburg, 21-24 September 1976). Discussion pp. 215-218.

51. ———. 1980. "A Note Concerning the Notion of Mereological Class. Postrscript." *Notre Dame Journal of Formal Logic* no. 21:679-683.
"Since the publication of my note concerning the notion of mereological class have noticed that a system of mereology—I shall refer to it as System $\mathbf{B_1}$—can be based on [a] single axiom." (p. 679)

52. ———. 1981. "Logic and Ontology." In *Modern Logic: A Survey*, edited by Evandro, Agazzi, 379-398. Dordrecht: Reidel.
"My discussion of the topic prescribed by the title of the paper will consist of two parts. In Part I, I propose to discuss, in very general and informal terms, the nature of logic and ontology, and the relationship that seems to connect these two disciplines. In Part II, I intend to examine, in some detail, a certain specific problem, which concerns logicians as well as ontologists, a problem which has been with us for about forty years, and which lacks a generally acceptable solution." (p. 379)
(...)
"In line with the traditional theory of quantification we are entitled to infer the proposition '(∃.*F*) • *F*(Socrates)' from the premiss 'Socrates is wise'. Now, if, as Quine tells us, the premiss does not commit us to the existence of properties but the conclusion does then the inference cannot be valid. I agree that the premiss carries with it no commitment to the existence of properties but I prefer to regard the inference as valid and reject the view that quantifying predicate variables commits us, within the framework of the traditional theory of quantification, to an ontology with properties or any other abstract entities.
If that is the case, how can the multicategorial ontologist present his doctrine in a standardised language? In my view he can still use any of the three languages we have distinguished, each time specifying informally the universe of discourse (the possible world) he is describing. Every statement of his theory will be about entities belonging to one universe of discourse or possible world. No proposition referring to more than one possible world will be expressible in any of the three languages at his disposal. Moreover, the language of the traditional theory of quantification will not enable him to deny the existence of any possible world as a whole. If he wanted

to do that, he would have to turn to the language of free logic or to L4 both appropriately re-interpreted. For the existence of a possible world can only be denied in an ontologically neutral language.
However, logic can offer a better way of helping the multicategorial ontologist in his predicament, a way which is also acceptable to his opponents. It consists in constructing an ontologically neutral multicategorial language. As far as I know, Kazimierz Ajdukiewicz, the Polish logician, was the first to see the possibility of such a language. Independently, some work in this field has been done by propounders of many-sorted theories (A. Schmidt, Hao Wang). For a concrete example of a standardised language for bicategorial ontology may I refer those who are interested to a paper of mine which I read at another Salzburg Colloquium, held in 1973 ('A System of Logic for Bicategorial Ontology', *Journal of Philosophical Logic* 3 (1974), 265-283)." (pp. 397-398)

53. ———. 1983. "A note on Leśniewski's axiom system for the mereological notion of ingredient or element." *Topoi* no. 3:63-72.
"A system of mereology in which the notion of ingredient or element plays the role of the only primitive, i.e., undefined mereological notion, was constructed by Leśniewski in 1920 and published in Chapter VII of his 'O podstawach matematyki' [On the Foundations of Mathematics], *Przeglad Filozoficzny* 33 (1930), 82ff. The axiomatic foundations of the system consist of the following four theses:
(a) if P is an ingredient of Q and it is not the case that Q is P then Q is not an ingredient of P;
(b) if P is an ingredient of Q and Q is an ingredient of R then P is an ingredient of R;
(c) if (every a is an ingredient of P and an ingredient of Q and for all R, if R is an ingredient of P or R is an ingredient Of Q then a certain ingredient of R is an ingredient of an a) then P is Q;
(d) if a certain object is an a then for some P ((for all Q, if Q is an a then Q is an ingredient of P) and for all Q, if Q is an ingredient of P then a certain ingredient of Q is an ingredient of a certain a).
On subjoining to the axioms the definition of the notion of part
(e) P is a part of Q if and only if (P is an ingredient of Q and it is not the case that P is the same object as Q);
and the definition of the notion of mereological class
(f) P is the class of as if and only if (P is an object, (for all Q, if Q is an a then Q isan ingredient of P) and for all Q, if Q is an ingredient of P then a certain ingredient of Q is an ingredient of a certain a).
Leśniewski went on to prove that his new system of mereology was inferentially equivalent to the original system as outlined in [2] and reproduced, in an improved version, in [3].
References
[2] S. Leśniewski, Podstawy ogólnef teoryi mnogości, [Foundations of the General Theory of Manifolds. I], Moskwa, 1916.
[3] S. Leśniewski, 'O podstawach matematyki' [On the Foundations of Mathematics], Chapter IV, Przegląd Filozoficzny 31(1928), 261-291.]." (p. 63)

54. ———. 1985. "Accomodating the informal notion of class within the framework of Leśniewski's Ontology." *Dialectica* no. 39:217-241.
Summary: "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 Leśniewski's Ontology."

55. ———. 1986. "Logic and Non-Existence." *Grazer Philosophische Studien* no. 25/26:209-234.

"1. Whatever exists, exists, and whatever does not exist, does not exist. And that's that. To put it in a different but equally tautological way
(1) a exists or it is not the case that a exists, whatever a may be or not be
It appears to follow from (1) that between existence and nonexistence there is no half-way house to accommodate subsistent entities or possible entities or fictitious entities. However, having said that, one must admit that a great deal of explaining has to be done before the notions of existence and non-existence lose their powers of confusing and mystifying. They enjoy these powers largely within the precincts of ordinary language and manifest them through inducing philosophers to make statements that are puzzling in the extreme or give rise to never ending controversies.
I propose to begin my inquiry into what there is or is not, by outlining a logic which, in my view, provides a promising basis for the starting of an attack on the problems of non-existence.
2. The logic to which I wish to relate the subject matter of my essay, is Leśniewski's Ontology.(1)"
(1) For an introduction to Ontology see my 'On Leśniewski's Ontology', *Ratio*, Vol. 1(1958), 150-176. For a comprehensive survey of Leśniewski' theories see E.C. Luschei, *The Logical Systems of Leśniewski,* Amsterdam
1962.

56. ———. 1986. "Logic, Ontology and Metaphysics." In *Philosophy in Britain Today*, edited by Shanker, S. G., 171-197. London: Croom Helm.
"The principal characteristic of ontology is, in accordance with Aristotle's conception of the science of being, its universality. The interest of a special science, Aristotle tells us, is limited to certain objects whereas the science of being studies all objects that there are, and does so generally, concerning itself with particular objects only in special cases. Extending Aristotle's idea a little further one can stipulate that if there are kinds of entity other than objects then the science of being should study these kinds of entity as well.
Another characteristic feature of the science of being, according to Aristotle, is this: the science of being lends itself to a very precise treatment and can be presented with the degree of exactitude unattainable in other disciplines. Does this mean that ontology, as conceived by Aristotle but elaborated up to the standards of exactitude established long after his time, can eventually be given the form of a deductive system or that of a body of deductive systems? I shall return to this problem at a later stage of my investigations." (p. 172)
(...)
"Can ontology, as conceived by Aristotle, be given the form of a deductive system or that of a body of deductive systems?
Any general description of reality is likely to consist of several theories, and the description just outlined above is no exception.
The interesting point is that the theories which are constituent parts of the reistic description of reality, are not unrelated. Some of them are presupposed by others. A theory **A** is said to be presupposed
by a theory **B** just in case the vocabulary exhibited in the theses of **A** has to be used in the theses of **B** together with the vocabulary characteristic of **B** whereas the latter vocabulary is not exhibited in the theses of **A** at all." (p. 187)
(...)
"This sort of vocabulary will be readily recognised as the vocabulary of the logic of propositions, and it is the logic of propositions that is presupposed by Ontology. It constitutes as it were the first chapter of a systematic presentation of the science of being. It presupposes no other theory, and on this account can be described as the most general theory of all. Every theory of lesser generality presupposes the logic of propositions and uses its vocabulary however limited this use may turn out to be.
Now, what kind of logic of propositions — and there are several kinds of logic of propositions — is the most appropriate theory, from the reistic point of view, to serve as the fundamental presupposition

of any description of reality? As ‘a philosopher interested in ontology I have no hesitation in suggesting that Lesniewski’s *Protothetic* is such a theory." (p. 188, anote omitted)

57. ———. 1989. "Formalization of functionally complete propositional calculus with the functor of implication as the only primitive term." *Studia Logica* no. 48:479-494.

Abstract: "The most difficult problem that Leśniewski 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 Leśniewski'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."

58. ———. 1995. "Remembering Stanisław Leśniewski." In *Stanisław Leśniewski aujourd'hui*, edited by Miéville, Denis and Vernant, Denis, 25-66. Grenoble: Recherches sur la Philosophie et le Langage.

"Kotarbiński was probably the first philosopher to realize that Lesniewski’s *ontology* had much in common with Aristotle’s « science of being as being » presented in the books of *Metaphysics.* Aristotle referred to it, occasionally, as *first philosophy*, and emphasized its generality. Whereas special sciences were, in his view, concerned with certain objects only to the exclusion of others, the science of being as being searched for principles which were true of everything that existed. Many centuries after Aristotle the science of being as being was given the name of *ontology*. In the first decade of the 20Ih century it was revitalized by Meinong as the theory of objects [*Gegenstandstheorie*] only to return to its earlier name in Lesniewski’s system of the foundations of mathematics. In a sense, this system has achieved completion. Arithmetic can be reconstructed within the framework of a part of it, namely within the framework of *ontology*, and *mereology* provides an important presupposition on which to base certain theories that belong to geometry(71). Ontology in the traditional sense of the term will never achieve completion. For we shall never be able to give a complete description of reality. Lesniewski’s ontology offers a very general, and - for this reason - a least controversial description of objects. Now *ontology* can be extended, step by step, into theories which provide more specific descriptions of what there is. The description obtainable within the framework of *mereology* is still very general but in part controversial, as some ontologist will maintain. In accordance with one of the *mereological* theses if in this world there are more objects than one then some objects are parts of other objects, and if this is so then some objects must be extended in time or in space, which suggests that mereology ought to be followed by a theory that concerns itself with objects as extended and ordered in time, or by a theory that deals with the extension and distribution of objects in space. Only the former theory, named *chronology*, is beginning to take form of a deductive theory, which as regards explicitness and precision may one day achieve the standard of Lesniewski’s *mereology*.(72) The latter theory, which could perhaps be called *stereology*, is still on the drawing board so to say. It is likely to prove to be more difficult than *chronology*, but, when successfully axiomatized, it may in conjunction with chronology provide a right framework within which one could try to describe objects in move. Thus, what may come after stereology, is a sort of general *kinematics*. To develop the above suggested extensions of the theory of objects to the point where they can be seen to have become deductive theories of the standard comparable with that of Lesniewski's *mereology*, will probably take several years of concentrated research by philosophers who, in addition to having a keen interest in symbolic logic, would have to be concerned in preserving and advancing the Lesniewskian way of doing philosophy." (pp. 84-86)

(71) B. Sobocinski, «L'analyse de I'antinomie Russellienne par Leśniewski », *Methodos*, vol. I, 1949, pp. 94-107, 220-228, 308-316 ; Vol. II, 1950, pp. 237-257. For English translation see : *Lesniewski's Systems*, ed. Srzednicki, 1984, pp. 11-44.

(72) C. Lejewski, « Accomodating the Informal Notion of Class within the Framework of Lesniewski's Ontology », in *Dialectica*, xxxix, 1985, pp. 196-197.