

The Reception of Stanisław Leśniewski's Ontology in Arthur Prior's Logic

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ABSTRACT: Arthur Prior's logic was influenced, among others, by logicians from the Lvov-Warsaw school. This paper introduces the impact Leśniewski's Ontology had on Prior's logical system. The paper describes the main characteristics of Leśniewski's Ontology, Prior's logical system and the manner in which Prior became acquainted with Leśniewski's logical system. Since Leśniewski was no longer alive when Prior began to develop his logical system and Leśniewski's papers were not easily available to Prior, this paper also includes Prior's interpretation of Leśniewski's logical system which did not always correspond to Leśniewski's original ideas.

KEYWORDS: A. N. Prior – Leśniewski's names – Leśniewski's Ontology – Stanisław Leśniewski.

1. Introduction

Arthur Prior's ontological position was in many cases unique as he combined intensional logic and nominalism. The aim of this paper is to demonstrate that Prior's distinctive ontological position was also made possible through his adoption of certain features of Leśniewski's Ontology.¹ This paper conse-

¹ Ontology is often written with a capital O in this paper. This indicates that we are

quently discusses the impact Leśniewski's Ontology has on Arthur Prior's ontological position and the ontological commitment of his logic.² One of Prior's (1971) texts even has Leśniewski's name in its title and Prior wrote several reviews of texts by students of Leśniewski which discussed Leśniewski's logical systems. The reasons Leśniewski's Ontology was interesting for Prior will also be mentioned.

Prior was acquainted with Leśniewski's works despite the fact that Leśniewski's papers were not easily available when Prior developed his logical systems.³ Prior knew this logical system from works of Leśniewski's students and colleagues and from personal communication with them (see Sobociński 1953, Lejewski 1956). Leśniewski's ideas could have, however, been misinterpreted by Prior because his knowledge of Leśniewski's logical system was primarily based on the work of his students and colleagues not on Leśniewski's own ideas. In addition, this paper discusses to what extent Prior departed from Leśniewski's original ideas when he incorporated his theory into his logical systems.

The form of Ontology in Prior's logical system is primarily examined in the works that both authors wrote at the end of their lives as their logical and ontological positions changed a great deal over the course of their lives. Leśniewski's *Foundation of Mathematics* and *On the Foundation of Ontology* and Prior's *Time and Modality*, *Object of Thought* and *Existence in Russell and Leśniewski* were thereby chosen for the analysis. In light of the fact that Prior primarily knew the works of Leśniewski's students, these works are also discussed, in particular Lejewski's *Logic and Existence* and Ślupecki's *Leśniewski's Calculus of Names*. Prior was also aware of Sobociński's works but Sobociński chiefly deals with issues which are not deeply investigated in this pa-

not speaking of ontology as it is understood in most philosophical debates but specifically as in Leśniewski's system of logic which is in some cases similar to ontology but which in many ways also differs.

² Although Leśniewski's impact on Prior is well known among logicians which handle with Lvov-Warsaw School (see e.g. Woleński 1989, 155; Simons 1982, 191; Urbaniak 2014a, 104 and 192), it is not discussed among logicians who focus on Prior.

³ Storrs McCall's book *Polish Logic* was published in 1967 and included two of Leśniewski's papers. Prior would have known this book since he wrote a review on it. Prior never quoted one of the papers as far as I am aware.

per. From the Ontological point of view, Sobociński's letters are of most interest. These are deposited in the Bodleian Library and in them Sobociński attempts to explain to Prior the main aims and procedures of Ontology and Prothetic.

It is worth emphasizing here that Leśniewski's and Prior's philosophies shared a common thread even though they came from different logical traditions. Prior began studying logic in traditions which were referred to as 'orthodox logical systems'⁴ by Simons (1982, 165). The orthodox systems of logic are systems created on the foundations laid by Peano, Frege and Russell. It is these systems which are the most widespread in modern logic at present. Leśniewski, in contrast, formulated his own logical system which differed from the orthodox systems in a number of aspects. It seems unusual that Prior, a logician from New Zealand who was primarily familiar with the Anglo-Saxon logical tradition, found common ground with a logician from Poland whose logical system is unusual in many features. As Uckelmann (2012, 352) points out, however, Prior discovered Łukasiewicz's work on the history of logic and his innovation in modern logic during his teaching at Canterbury University and became interested in his logical systems. Prior began to be introduced to the concepts of Lvov-Warsaw School through Łukasiewicz and his student Bocheński.

In light of the teachers of both Prior and Leśniewski, there is a common thread leading to the same person. This person was Franz Brentano who was the teacher of Meinong and Twardowski. Twardowski was the philosopher who established the Lvov-Warsaw School in Lvov before World War I and was more (e.g. in Łukasiewicz's case) or less (e.g. in Leśniewski's case) the teacher of nearly all the members of the Lvov-Warsaw School (see Woleński 1989, 3-7). John N. Findlay, who was A. N. Prior's teacher, studied for several years in Europe and published an influential book which discussed Meinong's Objects (see Copeland 2008). As a result, Leśniewski's logical systems were not as unfamiliar to Prior as they might have otherwise been.

When Prior discussed Leśniewski's logical system he nevertheless tried to adapt it to the orthodox logical systems. This approach was not without sacrifices on both sides and certain authors have doubts as to whether it was actually

⁴ This title is used throughout the paper.

successful (cf. Sagal 1973, 259-262; Simons 1982, 177). Their remarks will be introduced in the further part of the paper.

2. Leśniewski's System of Logic

Stanisław Leśniewski was one of the most renowned members of the Lvov-Warsaw School. He was born in 1886 and died in 1939. Leśniewski began to develop his logical system in 1916. He tried to invent a logical system which mathematics could be based on as Russell did in his *Principia Mathematica*. There are certain differences between Leśniewski and Russell. Leśniewski (1992a, 74-75, 126) was dissatisfied by Russell's solution of Russell's antinomy. Namely, as a nominalist he did not approve the existence of classes and sets. Hence, wanted to devise a system which would not contain antinomies and any of the other ambiguities which appeared in Russell's system and which at the same time would not presuppose existence of classes and sets (see Luschei 1962, 25-33; Urbaniak 2014b, 290-292; and Urbaniak 2015, 127-131).

Although Leśniewski was convinced that his system could solve previously mentioned problems which occurred in Russell's *Principia Mathematica*, this system is not widely used. Simons (2011) asserts that it might have been caused by the fact that Leśniewski's papers were primarily written in Polish and to a lesser extent in German. Leśniewski's perfectionism could have been another reason why his work was not well known in Prior's day. Since Leśniewski (1992a, 174-176) did not allow the publication of his texts until they were perfect, only a fragment of his work was published while he lived. After his death all his works were prepared for publication by his students. World War II began, however, shortly after Leśniewski's death and brought a stop to the publication of the texts. Leśniewski's texts were deposited in Warsaw which burned down when the Warsaw Uprising was defeated. Leśniewski's students and colleagues reconstructed Leśniewski's logic after the War (see Luschei 1962, 25-26) but following Leśniewski's death and the destruction of his works, it proved impossible to entirely reconstruct his work.

Leśniewski (1992a, 176-177) built his logical system on three theories: Protothetic, Ontology and Mereology. They are usually presented in this order because it represents a hierarchy. Protothetic together with Ontology are the

theories which demonstrated Leśniewski's logical position. Mereology is an extra-logical theory which deals with parts and wholes. These three theories are, according to Leśniewski, the basis for the foundation of mathematics. The division of logical theories into Protothetic and Ontology corresponds more or less to the division of two fields of logic, the logic of propositions and the logic of terms. Protothetic is also sometimes known as the calculus of propositions and Ontology is called the calculus of names (see Słupecki 1984; Pańniczek 1996).

Since each of Leśniewski's theories has been discussed in numerous papers, only Ontology, which had the greatest influence on Prior when he formulated his ontological position, is introduced. Protothetic is also dealt with in some of Prior's works and as Sobociński (1953) demonstrated in his letter, Protothetic and Ontology are strongly connected. In order to keep the paper within limits, however, I will focus exclusively on Ontology.

3. Leśniewski's Ontology

Leśniewski (1992a, 373-374) named the system Ontology, based on the Greek "ὄντος", which means "being" in English. He was aware that "ontology" was the name of a discipline which deals with "the general principles of existence" and that this description does not correspond with his concept of ontology. He also pointed out that his theory had certain similarities with the ontology defined by Aristotle and was part of a philosophical tradition spanning back centuries. Leśniewski presumed that if Aristotle's theory was described as the "the general theory of objects", it is not far from his own Ontology. Ontology introduces "some principles of existence" but in an extremely narrow sense. It describes Leśniewski's linguistic intuitions, the language and its usage but does not deal with beings themselves.

The way this works is contained in Leśniewski's concept of quantifiers, or more precisely the concept of a quantifier, because Leśniewski's Ontology includes only the universal quantifier in Leśniewski's original concept. Sobociński (1953) claims that the existential quantifier should not occur in Leśniewski's Ontology, even though, Leśniewski's students used it in his papers in order to simplify explanations.

3.1. The functor ε

The most important and the only primitive functor in Ontology is ε . According to Leśniewski, the best translation of this functor is the verb “is”, nevertheless, it is “is” with the meaning it has in Polish or Latin. Leśniewski (1992b, 608-609), as well as Russell (1919, 172), were aware that in English “is” could have more than one meaning. This is due to the difference between the definite and indefinite article which occurs in English and some other languages where it is not present in Latin, Polish and other Slavic languages. Although there is such a difference, Leśniewski, whose logical systems were influenced by his linguistic intuitions (see Miéville 2009, 4-5), expressed the functor ε as the colloquial Polish word “jest”. Leśniewski (1992a, 376-382) was aware that there are also differences in the use of colloquial Polish but as his followers (cf. Śłupecki 1984, 65; Rickey 1998, 31-32; Woleński 1999, 18-19) have demonstrated, the main difference in the usage of “is” lies between the languages which contain the definite and indefinite article and those languages which do not contain them.

The three meanings of the word “is” can be demonstrated by three statements which were also used by Leśniewski’s student Śłupecki (1984). In his article entitled *Leśniewski’s Calculus of Names*, Śłupecki introduces three examples of statements in which the word “is” has a different meaning in English and in Latin (Śłupecki 1984, 65):

Socrates is a man.

Socrates est homo.

The dog is an animal.

Canis est animal.

Socrates is the husband of Xantippe.

Socrates est coniunx Xantippae.

Śłupecki claims that the three statements in the first column have different meanings. Furthermore, if the statements in the second column are considered correct translations of the first column, their meanings have also to differ. Śłupecki points out, however, that Leśniewski worked with the form in which they all have the same meaning. Moreover, this meaning differs from the meaning “is” has in English statements. This meaning can be demonstrated by the description of the functor ε which occurs in Luschei’s book *The Logical System of Leśniewski*. According to Luschei (1962), the definition of the formula $A \varepsilon b$ is:

Singular predication or inclusion ("relation of being"): A is b; (the sole) A is (a or the sole) b; (individual) A is (one of the one or more) b; A is (an individual that is) b; A is one of the one or more individuals that are b; being b characterizes (individual) A; there is exactly (i.e., at least and at most) one A, and (any) A is b. (Luschei 1962, 10)

Słupecki (1984, 65-68) argues that Polish and Latin statements can be found in which "is" does not correspond with Leśniewski's description. Leśniewski (1992a, 376-382) problematizes them in his *Foundation of Mathematics*. Although the functor ε is equivalent to the word "is" in an ordinary article-free language, there are certain exceptions. The word "is" is not the equivalent of the word "exist" and also does not have the meaning "is now". Apart from the statement being meaningful, if the subject of the statement combined with ε is a common noun or an empty name where that statement is always false. The statement '*The dog is an animal*' consequently has to be rewritten. The correct form of this statement is '*Whatever is a dog is an animal*'. There is no such aid, however, for the statements which contain an empty name. As Słupecki (1984, 68) discusses, statements which have an empty name as a subject or predicate, such as '*Hamlet is the king of the Danes*' or '*Barack Obama is a vampire*', are false and there is no way to change it.

The difference in the meaning of the word "is" which exists between English and Latin led Słupecki to the conclusion that Leśniewski's functor ε cannot be translated into English. Rickey (1998, 31-32) and Woleński (1999, 18-19) disagree with his findings. Rickey suggests that English-speaking authors should use ε in a specific technical definition as it is used in Ontology. Woleński points out that the correct usage of the functor ε is not a case of linguistic intuition but requires a detailed analysis.

3.2. Nouns and names

A description of the Leśniewskian names is necessary since not every noun can serve as a value for the formula $A \varepsilon b$ if one intends to create a true statement. As was mentioned before, the statement '*Charlotte is a fairy*' or '*The giraffe is a mammal*' are grammatically correct and meaningful but nevertheless false in Leśniewski's Ontology.

When Sobociński (1953) describes Leśniewski's system of logic in his letter to Prior, he asserts that there are two semantic categories in this system, the category of names and the category of propositional functors. The

former category is the point of interest for this chapter. It will be demonstrated that there is a difference between the concept of names, as is well known in Russell's logical system and the concept of names in Leśniewski's ontology.

As Zuber (1998, 219) points out, this is also based on dissimilarities between Polish and English. Zuber (1998, 230-233) demonstrates that Polish is an inflected language and hence the statements do not have a strict form. It is grammatically correct in Polish to form the sentence '*Jacek jest przewodnikiem*' (Jacek is a guide) and the sentence '*Przewodnikiem jest Jacek*' is also correct. The subject is consequently not defined by the position of the term in a statement.

In addition, if the common noun in the sentence is connected with the determiner as in the sentences '*Każdy żołnierz jest odważny*' (Every soldier is brave), '*Ten żołnierz jest odważny*' (This soldier is brave), or '*Nasz żołnierz jest odważny*' (Our soldier is brave) then it belongs to the same semantic category as proper names in Polish. The bare noun without a determiner, in contrast, has no proper sense in Polish. The sentence '*Żołnierz jest odważny*' (A soldier is brave) is only tolerable when interpreted very broadly. Hence certain, but not every, common noun can be the term of a true statement in Leśniewski's logic. The problem lies in the fact that Polish, as well as other article-free languages, lack articles which play the role of determiners in other languages.

Apart from this distinction, which occurs between the Russellian and the Leśniewskian names, there is one more important feature of Leśniewski's system of logic from the ontological point of view, namely quantification. There is no doubt that the concept of quantification is one of the core concepts of Leśniewski's ontology. Namely, Leśniewski's quantification is not as linked with existence as Russell's. Leśniewski introduced an operator "ex" in order to formalize the verb "exist". The statement "Unicorn does not exist" is formalized as $[\exists a]. \sim ex(a)$ in his system of logic, which means "Some unicorn does not exist" (see Urbaniak 2008, 120).

As Urbaniak (2014a, 189-191) claims, several questions arise which Leśniewski did not address. Firstly, he points out that Leśniewski did not postulate which entities are values of variables which are bound by quantifiers. Secondly, there is no consensus among authors as to whether Leśniewski's quantifiers required ontological commitment as Quine's do. In contrast, there is mostly agreement among them that there is a difference between Leśniewski's and Quine's theories of quantification.

Several authors suggested solutions to these queries. Prior was inspired in this case primarily by Lejewski. Hence the interpretation, which Lejewski presented in his paper *Logic and Existence*, will be discussed. Lejewski demonstrates the diverse ontological concepts by a thought experiment:

To have a still simpler though fictitious example let us think of the universe as limited to two objects **a** and **b**. Then the corresponding expansions would be: $\mathbf{Fa} \vee \mathbf{Fb}$ and $\mathbf{Fa} \wedge \mathbf{Fb}$. Our language, which for reasons of simplicity needs not synonyms, may leave room for noun-expressions other than the singular names "a" and "b". We may wish to have a noun-expression "c" which would designate neither of the two objects, in other words which would be empty, and also a noun-expression "d" which would designate either. (Lejewski 1954, 109)

If the predicate F can be truly asserted to a and b , then the formula $\exists x(Fx)$ is true in Ontology but the formula $\forall x(Fx)$ is false, although both formulas are true in Quine's interpretation. This is caused by the fact that in Lejewski's interpretation the variable x in both formulas stands for all the noun-expressions. The formula $\exists x(Fx)$ in Lejewski's interpretation means either a or b or c or d have this property which is true since F can be ascribed to a , b and also d . The formula $\forall x(Fx)$ means that a and b and c and d have this property. The latter formula has to be upheld for all noun-expressions to be true and it is not since the noun-expression c has no reference. The formula $\forall x(Fx)$ consequently has to be false.

Although this seems to be the disadvantage of the system, other differences occur, which was later used by Prior, if it is analysed deeper. Namely, as Lejewski (1954, 109-110) pointed out that d behaves like a noun. It has to be reformulated as $D(x)$ in Quine's interpretation but not in Leśniewski's. It does not cause any harm that the constant d refers to two individuals in Ontology, unlike Russell's and Quine's system of logic where constants stand for precisely one individual.

Lejewski was of the opinion that this experiment also expresses the differences between quantification in Quine's and Leśniewski's logic. Based on Quine's famous theory of ontological commitment, variables which are bound by existential quantifiers have to signify something existent. In contrast, the Leśniewskian quantification in Lejewski's (and also Prior's interpretation) is different. Lejewski (1954, 113-114) therefore suggested that the designation

“existential quantifier”, which could be misleading in the Leśniewskian interpretation, should be replaced by the designation “particular quantifier”. This replacement is in accordance with the Leśniewskian interpretation of quantifiers. Lejewski was more likely to interpret more formulas with existential quantifiers in an Aristotelian way. A formula such as $\exists x(Fx)$ is not translated as “There exists x , such that Sx .” but “For some x , Sx ”.

The variables in Lejewski’s interpretation represent noun-expressions which refer to a concrete object or objects in the case of the noun-expression d . In addition, objects which can be unproblematically bound by quantifiers in Lejewski’s interpretation of Ontology include such dubious entities as numbers and colours. It therefore seems that objects are values of variables in Lejewski’s interpretation, even though in a quite wide sense of the word “object” and the variables refer to them indirectly. In the following chapters, the way in which Prior adopted these ideas will be presented.

4. Arthur Prior’s approach to logic

Arthur Prior is considered one of the founders of modern temporal logic and also created new systems of modal logic. Although Prior was an intensional logician, as Hugly & Sayward (1996, 47-48) point out, he did not postulate the existence of such entities as intensional objects because as a nominalist he did not acknowledge the existence of all abstract entities. The intensionality of his system consequently meant that he admitted intensional functions.

When Prior (1957) formulated his temporal logic, he intended to enclose it in natural language. This is the reason he also assumes the medieval concept of propositions, which differs from Frege’s. Based on this concept, a proposition can be true at one time and false at another time. The proposition ‘*The head of my Department is a logician*’ was therefore true when I wrote the first version of my paper and when it referred to the Department of Philosophy at which I work. The same proposition is currently false and would also be false when referring to a different department, because, according to the medieval concept of propositions, it is still the same proposition.

Although a logical system that includes this concept of propositions is closer to natural language, it has to manage the problem of entities which do not exist permanently. This is particularly the case when Prior developed

temporal logic, where past, present but also future figure. The following chapters discuss to what extent Ontology played a crucial role in solving this problem.

5. Prior discovers Leśniewski

Prior did not discover Leśniewski's logical system directly. When Prior began his correspondence with Polish logicians, Leśniewski had already been dead for several years. His archive had been destroyed and all Poles were far from their homeland. Thus, their access to Leśniewski's papers and papers of his other students and colleagues were limited (see Sobociński 1953, 5). Łukasiewicz was recognised by Prior (1955-1956, 199) as the man who introduced him to Leśniewski's logic. Łukasiewicz was not the only one of Leśniewski's colleagues, however, whose work Prior knew. Prior also mentions Sobociński's introduction to Protothetic.

Prior describes his first impression of Leśniewski's logical system in his paper *Definition, Rules and Axioms*. In this paper, Prior also discusses Protothetic logic and Leśniewski's theory of definition, not only Ontology. The article also demonstrates that Prior had several comments on Leśniewski's logical system. He firstly criticizes multiplying axioms which occur in Leśniewskian systems of logic and which were introduced to him by Leśniewski's students. He secondly has an aversion to Leśniewski's concept of names in which empty-names also occur. Despite his criticism, he later uses this specific concept of names in his nominalism. Even in this paper he appreciates certain features of Leśniewski's system.

Although Prior was initially critical of Leśniewski's logical system, it influenced a great deal of his own logic. This can be illustrated through a comparison of two of Prior's books. Prior was interested in the history of logic and was preparing the publication of an exhaustive book about this topic. Its title would have been *The Craft of Formal Logic*⁵ but due to its length the publishing house recommended that Prior shorten it. Prior instead wrote a new book entitled *Formal Logic* (see Copeland 2008). After Prior's death, certain fragments of *The Craft* were published by P. T. Geach and A. J. P. Kenny. This book was entitled *The Doctrine of Propositions and Terms*.

⁵ The title of this book is consequently shortened as *The Craft*.

Prior demonstrated here his brilliant knowledge of the history of logic. Although the Polish logicians Łukasiewicz and Bocheński are mentioned in this book, his main discussion is on ancient and medieval logic along with the logical theories of the 19th century and the beginning of the 20th century. In contrast, *Formal Logic* focuses considerably on the logical systems of Polish logicians.

Leśniewski's system is often discussed in Prior's later works. It seems that Prior appreciated Leśniewski's work more when he developed his own temporal logic. When Prior (1957, 63-75) formulated his ontological position in his *Time and Modality*, he criticised Russell's concept of names as inappropriate to his systems of logic. Hence, in his system of logic ΣT_2 , he combined tense logic and Ontology, primarily Leśniewski's concept of names. Prior emphasizes that the difference between this system of logic and the ΣT_1 system, where Russell's calculus is used instead of Ontology, is that proper names are replaced by common nouns in ΣT_2 . Prior also uses Leśniewski's functor⁶ when he describes Ontology here. Ontology helps Prior to solve the problem of entities which do not have an actual existence.

In contrast, Prior was aware that Leśniewski's concept of logic differs considerably from his own. Leśniewski considered propositions as timeless and has a preference for extensional logic. Hence ΣT_2 could not completely replace ΣT_1 , but Prior incorporated some parts of ΣT_2 to ΣT_1 to utilize the advantages of both systems. He also pointed out that the ΣT_1 system had to be enriched by special propositional and predicate variables.

Since Prior first worked on improving his logical systems of temporal and modal logic, he postponed addressing questions which arose in his own ontology. Consequently, his most important book, *Past, Present and Future*, which was published after the publication of *Time and Modality*, does not contain any satisfactory improvement of his ontology. The concept of names which Prior prefers is clearly formulated:

...we just have no Russellian individual name-variables at all, bound *or* free, but only devices for referring to individuals obliquely, as in Leśniewski's 'ontology'. (Prior 1967, 162)

⁶ However, Prior used in *Time and Modality* the symbol "€" instead of "ε" which could be misleading as will be discussed further.

It is still doubtful, however, whether Prior was actually able to interpret Ontology correctly. In spite of the differences that exist between orthodox logic and Leśniewski's system, Prior was more acquainted with the works of Leśniewski's students than Leśniewski's own papers. The differences which arise between Prior's interpretation of Leśniewski's system and Leśniewski's original system are consequently discussed in the following chapter.

6. The reception of Ontology in Prior's logic

6.1. Prior's interpretation of the functor ε

Although ε was described as "is" in article-free languages such as Polish and Latin, it was shown in a previous part of this paper that English researchers are able to use it properly. It only requires precision in the use of this specific term. This chapter will therefore investigate whether Prior used the functor ε correctly and what his interpretation of this functor was.

Prior's concept of the functor ε was influenced by Lejewski's understanding of it, since they discussed it in their letters (see Lejewski 1956). Prior was also acquainted with Słupecki's paper *S. Leśniewski's Calculus of Names* in which Słupecki introduced Ontology. Prior adopted this concept in his own paper *Existence in Leśniewski and in Russell*.

Leśniewski meets this difficulty by introducing an undefined constant expressing a relation between classes – it can be, but does not need to be, the functor "ε" previously mentioned. This functor, as I have also previously said, has arguments of the same logical type, so that what it express is *not* Russellian class-membership. It express rather the *inclusion* of a unit class in another class. (Prior 1971, 163)

This is not Leśniewski's original interpretation of the functor ε , however, and Prior is aware of this. He continues in the very next part of his paper: "...and although Leśniewski himself did not like it, no other interpretation of the symbol seems to me intelligible" (Prior 1971, 151); and Prior clearly admits in his paper that the interpretation of the functor ε , which he has chosen, is not Leśniewski's.

Additional reasons for why Prior rejected Leśniewski's interpretation of the functor ε can also be found. The most plausible explanation seems to be,

however, the one offered by Simons in his paper *On Understanding Leśniewski*. Simons (1982, 165) examines ways of understanding Leśniewski's logical system by logicians which came from a tradition that Simons calls the orthodox systems of logic. Since Prior came to Ontology from this position, he must have perceived Ontology by means of the tools of the orthodox logical systems.

When Prior (1957, 63-75) uses Leśniewski's names, he does so without the ambition of reconstructing Ontology. He attempts to implement some of Leśniewski's inventions in his own logical system. His system is consequently closer to orthodox logic than the Leśniewski system, as he interpreted the functor ε in a way in which it is more translatable in orthodox logic. The meaning of the functor ε in Prior's interpretation lies somewhere between the Leśniewskian ε and the Russellian \in . This could be problematic. As Śtupecki (1984, 69-72) stresses that and Russell's \in cannot replace Leśniewski's ε , and vice versa, since Leśniewski's functor binds two words which belong to the same semantic categories while Russell's binds a name and a class.

There is still one more distinction between Leśniewski's and Prior's concept of the functor ε . Since in Prior's logic propositions can have different truth values at different times, and individuals are postulated as temporal, Prior distinguishes three possible meanings of the functor ε . Prior (1957, 76-83) emphasizes this in his *Time and Modality* when he discusses the two meanings of the article "the", the weak "the" and the strong "the". As Leśniewski did not hold this concept of propositions, nothing similar occurs in his logic system.

The weak "the" is an article in the formula "The a is a b " where the specification depends on the time frame, as in the statement "The president of Russia is the owner of a dog". This statement can only be true when there is only one individual which the predicate can be assigned to at the time of utterance. The statement was consequently true when this paper was written but was not true several years ago when Dimitri Medvedev was president of Russia and it might not be true after Vladimir Putin finishes his career. Therefore, the weak "the" has only a temporary significance. This sense holds the functor \in in the ΣT_2 system.

In contrast, the strong "the" fixes its signification regardless of time. If there is the strong "the" in the statement "The a is a b ", the a , which is a b , is the only one individual that ever was, is or will be the a . Examples of such a statement could be "The best known pupil of Plato was a clever man". When

the strong “the” is used in the logical system, the functor \in is replaced by the functor \in' . Prior additionally defines a new logical system, ΣT_3 , where the functor \in' applies.

Prior also introduces the functor \in'' . The functor \in'' is derived from the functor \in' and describes the situation when, in the statement “The a is b ”, the subject is characterised by the strong “the” and the predicate is an identifiable individual.⁷ Prior called the logical system in which the functor \in'' occurs the naïve object-existent system. The functor \in'' is the most useful functor among the \in -functors because it enables Prior to create statements which deal with non-existent entities. He does not need to postulate either their existence or their properties. Prior does not want to postulate *possibilia* in this way, but in his concept of individuals, he has to deal with entities which do not actually exist, but which existed or will exist.

Prior's treatment of individuals of Ontology is distant, however, from Leśniewski's own interpretation. Simons (1982, 177-182) in his article demonstrates that the functor ε can be interpreted in accordance with Leśniewski's definition, but that interpretation does not suit the requirements of Prior's logical systems. The functor ε and the terms which are bound with it have an existential import in Simons' interpretation. Prior (1971, 161) requires, for the applicability of the system, a different concept of terms bound by the functor ε (or \in in some of Prior's works (Prior 1957, 63-75)). In addition, it is obvious that there are more differences between Prior's and Leśniewski's positions. They will be introduced in the following chapter, where Prior's concept of Leśniewskian names is discussed.

6.2. The difference between the concept of nouns in Ontology and Prior's logical systems

Since Leśniewski's Ontology is also described as the calculus of names, Prior's concept of names can demonstrate to what extent Prior actually associated Ontology with his own logical system. As was shown in previous chapters, Prior rejected the Russellian names because he did not want to postulate the existence of actual non-existent entities, although he had to work with them

⁷ The Identifiable individual is an individual which has a contingent existence but is determined by its past. Its future is open but it cannot act otherwise than it acted in the past. Moreover, events that happened to it also cannot change (see Prior 1968, 66-77).

in his temporal logic. He consequently incorporated Leśniewski's names into his system instead of those of Russell.

Simons (1982, 177-182) emphasizes that Prior also did not fulfil all the stipulations that are identified in Ontology. Although Prior was aware that his interpretation of the functor ε differed from Leśniewski's, he in all probability did not possess any doubts about his interpretation of the Leśniewskian names which he included in his own logical system. Simons observes, however, two different interpretations of Ontology which can be found in Prior's work. He finds that Prior construed Leśniewski's names as class names or as common names. This does not mean, however, that Prior had two different understanding of Leśniewskian names. These two concepts are primarily connected in Prior's work.

An example of such a connection can be found in Prior's paper *Existence in Leśniewski and in Russell*. Firstly, Leśniewski's names are described as class names. Prior claims:

Ontology's so called "names", in other words, are not individual names in the Russellian sense, but *class* names. This immediately explains the first two of the peculiarities I have mentioned. For while it makes nonsense to divide up individual names in this way, class-names *are* divisible into those which apply to no individuals, those which apply to exactly one, and those which apply to several. It makes sense also to say that some classes "exist", either in the sense of having at least one member or in the sense of having exactly one member, and some classes do "exist" in these senses and some do not. (Prior 1971, 162)

Prior's replacement of the symbol ε with the symbol \in also affirms that he considered that Leśniewski's names behave like classes.⁸

Simons (1982, 177-178) emphasizes that Leśniewski as a nominalist cannot agree with the postulation of classes. Prior does not agree, however, with the postulation of classes either. He also considered himself a nominalist. In spite of the fact that he uses class to approximate Leśniewskian names to the orthodox logical systems, he rejects them having some means of existence. He claims:

It may seem from what I have said that ontology, on my interpretation of it, is committed to the existence of classes as nameable entities, though in

⁸ This feature of Prior's paper was particularly criticised by Sagal (1973, 259-262).

fact Leśniewski was notoriously nominalistic. But this is a misunderstanding, arising from the use of the perhaps unfortunate term "class-name". What we have to deal with here are *common nouns*, and these are not strictly speaking *names of objects* at all. (Prior 1971, 165)

When Prior postulates Leśniewskian names in his logical systems, however, both descriptions can be used. They are defined as class names, and the hierarchy of classes can describe precisely how they operate in a logical system. From the ontological point of view, however, they are treated as common nouns. As Słupecki (1984, 71) emphasizes, nouns bound by the functor ε should be of the same semantic category. Hence the concept in which Leśniewskian names are described as common nouns complies better with Leśniewski's requirements.

In contrast, as Urbaniak (2014a, 189) points out, there is no consensus among authors as to which entity is represented by the bound variables in Leśniewski's Ontology. It consequently cannot be claimed that it was actually Leśniewski's concept of names which played such an important role in Prior's ontological ideas. It was instead several of Leśniewski's ideas primarily surmised from the works of Leśniewski's pupils. In addition, these ideas were occasionally misunderstood by Prior and when mixed with orthodox logic resulted in the formulation of names that Prior calls Leśniewskian in his logical systems.

7. Conclusion

To sum up, although Prior adopted Leśniewski's concept of names, not everything that he attributed to Leśniewski was actually compatible with Leśniewski's concepts. There are common features in both Prior's and Leśniewski's systems of logic. They both tried to create systems of logic which can be combined with nominalism and both also had a preference for natural language to the formal system. In contrast, Prior developed some ideas which he found in the papers of Leśniewski's students so radically that even he had to admit that they differed from Leśniewski's thoughts. This can be demonstrated by the functor ε , in which the change in usage was caused by the difference between Prior's and Leśniewski's concept of propositions. Finally, the concept of names, which is not the same in Ontology and Prior's logical systems, can be representative of the third way in which Prior adopted

concepts of Ontology. Although Prior thought that he introduced the Leśniewskian names into his logical system, they did not fulfil all of Leśniewski's requirements.

The adaptation of some features of Leśniewski's system of logic, even though misinterpreted in certain ways, nevertheless enabled Prior to formulate his ontological position. The contribution of Leśniewski's Ontology is remarkable primarily in Prior's concept of names in which he had to combine nominalism with the intensional context and medieval concept of propositions.

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