Łukasiewicz and Leśniewski on Contradiction

It was in 1911 that Łukasiewicz and Leśniewski met. Leśniewski himself reported that at that time he had read Łukasiewicz’s masterpiece *On the Principle of Contradiction in Aristotle* (1910),1 and, as Lejewski knew from Łukasiewicz, he said he had come to criticize the author.2 In the same year Leśniewski wrote “An Attempt at a Proof of the Principle of Contradiction”, which was published in 1912 on *Przegląd Filozoficzny* and was addressed on the whole against Łukasiewicz’s book.3

Whereas the role played by the principle of contradiction in the development of Łukasiewicz’s ideas is generally speaking correctly underlined,4 it is not so in Leśniewski’s case. Surely the oblivion which covered Leśniewski’s early writings prevented the scholars from regarding the issue worthy of inquiry in his philosophy. Yet the controversy between Leśniewski and Łukasiewicz on the principle of contradiction may be considered quite rightly a touchstone between their very distant philosophical attitudes, which remained that way also later.

It is hard to exaggerate the great weight Łukasiewicz’s monograph had in the Polish logico-philosophical scene. Although po-

*Added in proof. This paper was written in 1996. Until the publication in this issue it has circulated in various versions and forms. Although the bibliography has been updated for the occasion, the paper has not been revised as regards content. Work on this article has been funded by NWO-grant n° 275-80-001.*

2 Cf. Lejewski [1995], p. 28.
3 Cf. Leśniewski [1912].
4 Cf. for instance Wolenski [1990], p. 191; [1989], p. 119; [1987], p. XXXIV.
lemically inspired, Leśniewski did acknowledge the importance of Łukasiewicz’s work:

<My> results [...] on the whole oppose the theoretical theses supported by Łukasiewicz [...] But the polemical character <of some passages> should not arouse in the reader the erroneous conviction that I turn a blind eye to the theoretical value of Łukasiewicz’s work, which I regard as one of the most interesting and original of the entire ‘philosophical’ literature known to me.⁵

Łukasiewicz’s *On the Principle of Contradiction in Aristotle* (1910)

Even if the appendix included in Łukasiewicz’s monograph, “The Principle of Contradiction and Symbolic Logic” – written to the model of Louis Couturat’s *Algèbre de la logique* (1905) – was not the first publication in formal logic in Poland,⁶ it was surely the most popular handbook among Polish philosophers. Perfectly appropriate to the context of the book, the appendix was probably the best contribution to Łukasiewicz’s fundamental claim that the principle of contradiction – in the form 1 → ¬(α ∧ ¬α) – is by no means the supreme principle of logic, being an ordinary theorem that in the simplest case may be inferred from other 11 theorems; moreover, it keeps on remaining true even denying the Postulate of Existence of non-contradictory objects (1≠0), although in this way it turns out to be true also 1 → α ∧ ¬α.

To mark the distance between Aristotle’s and his own positions, Łukasiewicz presents a résumé, more or less like the following.⁷

**J1. There are three formulations of the Principle:**

*Ontological (OPC)* No object may at the same time possess and not possess the same property;

*Logical (LPC)* Two judgements of which the first ascribes to an object exactly that property which the second denies to it cannot be true at the same time;

*Psychological (PPC)* Two opinions to which correspond contradictory judgements cannot exist in the same intellect at the same time;

OPC, LPC, PPC are not *synonymous* formulations, because they contain different concepts (object/property, judgement/truth, opinion/temporal co-existence), nevertheless, given that true judgements (positive and negative) correspond to objective facts, i.e. relations of possessing and not possessing of properties by an object, OPC is *equivalent* to LPC; PPC cannot be an *a priori* certain judgement, but at most an empirical law.

**J2. PC in the formulation OPC or LPC requires a proof, since it is not an ultimate principle. For ‘ultimate principle’ it is to be understood a judgement not to be proved from other judgements, since it is true by itself. The sole judgement true by itself is the definition of true judgement.**

**J3. PC is not the supreme law of logic, neither the necessary, nor the sufficient condition for the other laws of logic. The proof is that we can deductively and inductively infer without it.**

**J4. PC is different both from the Principle of Identity and from the Principle of the Double Negation and it cannot be inferred from any of them, neither from the definition of false judgement, nor from the concept of negation. Applied to contradictory objects, PC is false, although the Principle of Identity and the Principle of Double Negation are both true. It is not possible to prove PC neither referring to its immediate evidence (evidence is not a truth criterion, since even false judgements may turn out to be evident; besides, PC is not evident to all people), nor to its psychological necessity (which, fixed as it seems in our mental organization, forces us to admit PC); from the psychological point of view false judgements may be necessary, too; moreover, not everybody feels the necessity to admit PC.**

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⁵ Leśniewski [1912], p. 202. Translations are mine, unless otherwise indicated.

⁶ The first was Stanisław Piątkiewicz’s *Algebra w logice* (1888), cf. Batóg-Murawski [1996].

⁷ Cf. Łukasiewicz [1910a], *Dodatek*, §9, pp. 185–196 (Germ. transl. pp. 231–245).

J5. The only formal proof of PC is based on the definition of object as 'what does not possess contradictory properties': it is, however, a formal proof and not a concrete proof.

J6. A concrete proof of PC would require the proof that everything that is an object in the first sense (it is something and not nothing) is an object in the second sense, too (it does not contain contradictions); but such a proof cannot be carried out. Indeed, on one side there are several contradictions among a priori mental constructions (transfinite numbers, Russell's antinomy), on the other side there is not any guarantee that even apparently non-contradictory constructions do not contain contradictory properties; besides, in reality it is possible that there is contradiction in the continuous change which the entire real world is subject to. If experience does not demonstrate that contradiction, it does not deny it: neither in this case is there any guarantee that apparently non-contradictory things and phenomena do not contain contradictory properties.

J7. Since PC cannot be proved, notwithstanding it requires a proof, it is devoid of logical worth. At the same time it possesses an extraordinary ethico-practical worth: it is the sole weapon we have against errors and lies.

Lesniewski's "Attempt at a Proof of the Ontological Principle of Contradiction" (1912) as published in Logical Studies (1913)

As already clear from the title, Lesniewski pays attention exclusively to the ontological version of PC, i.e. OPC. Lesniewski opposes Łukasiewicz that OPC requires a proof indeed, but it may be carried out, so that OPC is not "devoid of logical worth" at all. The philosophical heart of the controversy mostly centres on J5, J6, J7, that is the opposition Łukasiewicz draws between a formal and a concrete proof of OPC; the claim that there are contradictory objects in formal constructions and maybe in reality, too; that OPC cannot be proved.

In actual fact, Lesniewski did not turn a blind eye to Łukasiewicz's work. On the contrary, his eye was wide-open: with his typical maniacal analysis, he turned against Łukasiewicz many of the latter's ideas and results, "entangling him in his own web".9

The Attempt was re-handled and translated by Lesniewski himself together with his first paper, "A Contribution to the Analysis of Existential Propositions" (1911) in the booklet Logical Studies (1913), which contains a re-organization of the materials presented in the two papers.10 The changes are very radical in the case of the Contribution, slighter for the Attempt - apart from a different order of the treated issues and a decisive addition: the famous critique of general objects, which appeared for the first time in Logical Studies, and not in "The Critique of the Logical Principle of the Excluded Middle" (1913), where it was only repeated.11 Since Logical Studies presents a better exposition of Lesniewski's ideas and it marks a crucial step for the development of Lesniewski's thought,12 from which he would not return, my analysis will be based on the first part of the booklet corresponding to the Attempt (labelled henceforth Attempt2) more than on the Attempt itself (Attempt1), critique against general objects included.13

Lesniewski's proof is preceded by some logical, semantic and ontological premises. Thanks to them and to some conventions he introduces, he concludes - through some synonymous formulations - that OPC is true.

The main points of the Attempt2 may be outlined as follows:

S1. Linguistic expressions may or may not have symbolic function, that is the property to symbolize or not an object. They can be also connotative, i.e. to connote some properties, or, equally, to signify something, or not. Connotative expressions are those expressions that can be defined per genus proximum et differentiam specificam. Below are some examples given by Lesniewski himself:

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9 The rich image is Kotarbiński's (Kotarbiński [1921], p. 105), who, nevertheless, uses it for other purposes.
10 Cf. Lesniewski [1913c].
12 Cf. Betti [1998a] and [1998b].
13 Lesniewski [1913c].
In particular, 'object' is a symbol of anything, and is non-connotative because it cannot be defined *per genus proximum et differentiam specificam* unless we fall into a regressus in infinitum, since 'object' is synonymous with 'being', and 'being' is *sumnum genus*. Expressions may or may not have the property of *symbolic disposition*: an expression which has this property only seems to symbolize something, no matter whether it does or not. *Sentences* are those expressions that all have *disposition of symbolizing relations of inherence*. A sentence is *true* when it has symbolic function, it is *false* when it has not; the symbolic function of a sentence depends on the symbolic functions of the component terms. *True sentences* of the form 'a is b' symbolize relations of inherence. The sentences

1. 'Every man is mortal'
2. 'A hippocentaur possesses the property of horsemess'

are linguistic expressions with symbolic disposition, that is both have disposition of symbolizing a relation of inherence, i.e. the possessing by every object denoted by the subject of the properties connoted by the predicate, but (1) has symbolic function, while (2) has not.

**S2.** The Ontological Principle of Contradiction is the sentence OPC. We may substitute several synonymous formulations to OPC. In order to see if any two sentences are or are not synonyms we need to reduce them to the *canonical form* 'a is b'. The convention re-written as follows is an example of such a reduction:

(3) Any sentence of the form 'x is b → x is c' is synonymous with the sentence 'xb is c',

that is to say that a conditional sentence of the form 'x is b → x is c' is synonymous with the sentence in canonical form 'x-with-the-property/ies-connoted-by-b is c'.

**S3.** From S2 it stems that the sentence

4. If x is an object, then x cannot have and not have at the same time the property c

is not synonymous with OPC. The proof follows from applying (3) to (4), where b is represented by 'object'. Since 'object' is non-connotative, no object is denoted by 'xb', i.e. is the object with the properties connoted by 'object'; for this reason (4) and OPC, whose subject denotes anything, are not synonyms. The sentences

5. Every A is B
6. If something is A, then it is B

are not synonyms, too.

**S4.** As *philosophia prima, metaphysics* – as Aristotle indicated – is the system of all the true sentences about all the objects in general.14 From S3 it follows that metaphysics can be built not as a system of conditional sentences, but as a system of categorical sentences. However, metaphysics has nothing in common with sentences about the so-called 'general objects'. Conceptions about general objects lead to non-objectual speculations, and we might get rid of those conceptions once and for all by the following proof. Let a 'general object' be an object which is *general* with respect to a certain group of individual objects. Such an object may possess only those properties which are common to all the individual objects corresponding to it, for instance triangularity for the 'triangle in general' which does not possess equilaterality, or isoscelesness, etc.

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14 Leśniewski quotes the incipit of Aristotle’s *Metaphysics* (D 1003, 21): ἔστιν ἐπιστήμη τῆς θεωρεῖ τὸ ᾗ ὁ ὁ καὶ τὰ τούτω ὁμάλον καὶ αὐτὸς ἄτομο*.* Cf. Leśniewski [1913c], Remark IV to §3, p. 139, n. 81.
Proof. (Premise) A certain object \( P_k \) is a general object corresponding to the individual objects \( P'_1, P'_2, P'_3...P'_n \).

i. For every individual object \( P'_k \) it is always possible to find a property \( p_k \) not common to the individual objects \( P'_1, P'_2, P'_3...P'_n \).

(1) The general object \( P_k \) has not the property \( p_k \).

ii. The individual object \( P'_k \) having the property \( p_k \) does not possess the property of not possessing the property \( p_k \); otherwise, if it were non-possessing \( p_k \) it would be a contradictory object, because it would be an object possessing and at the same time non-possessing the property \( p_k \).

iii. The property of not possessing the property \( p_k \) is not common to all the individual objects \( P'_1, P'_2, P'_3...P'_n \) since the individual object \( P'_k \) possesses the property \( p_k \).

(II) (For this reason) the general object \( P_k \) has not either the property of not possessing the property \( p_k \); i.e., it is not non-possessing the property \( p_k \); that is, it possesses the property \( p_k \).

From comparing (I) and (II) it turns out that the premise leads to a contradiction. Thus the sentence that a certain object \( P_k \) is a general object is false, that proves at the same time that no object is a general object.

S5. Establishing linguistic conventions has nothing in common with conventionalism: linguistic conventions are not indemonstrable sentences about objects and properties over which one has no power, but true sentences about states of affairs (stany rzeczy) created by whoever establishes them.

S6. OPC is a true principle and it can be proved. The proof is divided in two parts:

I. Proof that every object is non-contradictory;

II. Proof that the sentence “Not every object is non-contradictory” is a priori false.

Leśniewski versus Łukasiewicz

The real heart of Leśniewski’s Attempt\(^2\) is the semantic analyses presented and the theoretical tension associated by Leśniewski with OPC. Leśniewski requires that if a sentence ‘\( a \) is \( b \)’ has to be true, the subject a must have symbolic function (or must be not empty or non-denotative or non-objectual);\(^16\) therefore the sentence

7 A hippocentaur is a horse

is false, because ‘hippocentaur’ is an empty name. In a remark which advances the conclusions of the Attempt\(^2\), from this point of view the most important of the paper, Leśniewski proclaims his disagreement with Łukasiewicz’s statements, according to which ‘hippocentaur’

denotes truly something of non-existing, but it is not <expression> devoid of meaning

and ‘the square built by rule and compasses and identical as regards the surface area to the circle of a radius of 1’ denotes “an object with contradictory properties”.\(^17\)

Classical examples of contradictory objects are ‘wooden irons’ [...] ‘square rounds’ or ‘round squares’. Some regard these funny combinations of words as empty sounds, sounds devoid of meaning. As to me, I deem that they are not simply empty sounds, like ‘abracadabra’ or ‘mohatra’, but yet they mean something. In fact it is possible to predicate about the round square that it is a round, that it is a square, a contradictory object, etc., while it is not possible to predicate something about ‘abracadabra’, because this word does not mean anything. [...] ‘the square built by rule and compasses and identical as regards the surface area to the circle of a radius of 1’ [...] is therefore a contradictory object, and yet it means something, is something, is an object.\(^18\)

Although also for Leśniewski the meaning of ‘hippocentaur’ and of ‘object with contradictory properties’ is perfectly determined (for instance ‘hippocentaur’ connotes the property of humanity and the property of horseness),\(^19\) neither ‘something of non-existing’ nor

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\(^15\) Corrected from ‘object \( P \)’ in Leśniewski [1913c], Remark V to §3, p. 141. Cf. also Leśniewski [1913b], Remark II to §1, p. 319 (Engl. transl. p. 50).

\(^16\) Leśniewski [1913c], Remark II to §18, p. 132 = Leśniewski [1912], p. 220 (Engl. transl. p. 40), with minor changes.

\(^17\) Leśniewski [1913c], Remark II to §4, p. 126 = Leśniewski [1912], p. 213 (Engl. transl. p. 32), with minor changes; Łukasiewicz [1910a], pp. 65–66 (Germ. transl. pp. 80–91).

\(^18\) Cf. Łukasiewicz [1910a], pp. 60–61 (Germ. transl. 74–75).

\(^19\) Cf. Leśniewski [1913c], Remark II to §4, p. 126 = Leśniewski [1912], p. 213 (Engl. transl. p. 32), with minor changes.
'object with contradictory properties' denote any object, because no object is 'something of non-existing', since no object has any property of 'non-existence' connoted by that expression '<something of non-existing'>.20

I should also remark that Leśniewski's definition of synonymous sentences differs from Łukasiewicz's in so far as the first requires the subjects to be not only denoting the same objects, but also connoting the same properties, so that the sentences

(8) Aristotle was the creator of logic
(9) The Stagirite was the creator of logic

are not synonyms in Leśniewski's view ('Aristotle' connotes the property of having the name 'Aristotle', while 'Stagirite' does not).21 Moreover, Leśniewski does not discuss the difference synonymousness/equivalence: all the transformations of sentences he deals with are salva significatione, and synonymousness seems to be the relation between sentences he wants to preserve in inferences. The argument in S3. is addressed directly against Łukasiewicz: Łukasiewicz asserts that OPC is synonymous with its conditional formulation (4),22 since

every general judgement, positive or negative, presents a link between two judgements: 'Every A is B' means in fact that 'if something is A, then it is B' [...] There is not any doubt about the synonymousness of these forms.23

Leśniewski refutes the synonymousness of OPC with (4) for the non-connotativity of 'object'. On (4) Łukasiewicz founds the sole formal proof of the Principle of Contradiction:24 (4) is indeed the appendix's theorem

T30. \( 1 \rightarrow \neg(\alpha \land \neg\alpha) \)

which is proved on the basis of definition of 'object' as 'something which is non-contradictory' and is

\[ \text{like all the laws of symbolic logic, only a hypothetical theorem which establishes that if P is an object, then P cannot at the same time have and not have c. But it does not follow from this that P is an object, i.e. is simply an object and is not at the same time a non-object.}^{25} \]

To obtain a concrete proof of PC it would be necessary to prove not (4) but

(10) If \( P \) is something and is not nothing, then \( P \) is a non-contradictory object.26

Łukasiewski and Leśniewski on Contradiction

Leśniewski is not seeking for any concrete proof of OPC beside the formal one: on the contrary, to prove OPC means to prove that OPC is a true sentence in so far as accepted conventions and semantic premises allow. Well, for Łukasiewicz the impossibility to prove PC concretely (10) and not only formally (4) – where for 'concrete proof' is meant an answer to the question 'Are there contradictory objects?' – was opening new and fruitful perspectives to logic. We know actually that from this moment Łukasiewicz was driven to theorize a non-bivalent system of logic ('non-chrysippean' he was to christen it later):27 reality does not prove nor deny PC, so if it is an ordinary theorem and not a principle and less than ever the supreme law of logic,28 as Łukasiewicz tried to show, other logics are possible.

The disputation between Leśniewski and Łukasiewicz seems from these first remarks to centre in its fundamental features on pure ontology, if it is true that – according to Kotarbiński's 1966 definition – Łukasiewicz's appendix was a treatise of general theory of objects.29 If the crucial element to be noticed appears to be a purely ontological controversy between Łukasiewicz and Leśniewski, that is the possibility – admitted by the first, denied by the second – that in reality there are contradictory (and fictitious) objects, the controversy ends up by regarding different ways of understanding 'object'. In this respect there are several matters to be considered from the historical point of view, that lay in the

\[ \text{Kotarbiński} [1966], p. 158. \]
background of this discussion. One should not forget that Łukasiewicz’s position, according to which ‘object’ is that which is something and not nothing – distinct from the object that is something but also exists, so that there are objects which exist and objects which do not exist – recalls on one side immediately Twardowski’s ideas, on the other side has the very redundant ontology of Meinong as background, with the distinction Sein-Sosein. It is not a mystery that Meinong had a considerable influence on the development of Łukasiewicz’s logical ideas. It should be noticed that – as regards the genesis of three-valued logic – Łukasiewicz launched his attack simultaneously against PC and the Principle of the Excluded Middle: in the latter case a non-marginal role was played by meinongian incomplete objects, more than twardowskian general objects, to which – however – the former owed very much. Łukasiewicz not only quotes several times Meinong’s name in the book and in the dense German abstract which he published, but immediately after having drawn up the work on Aristotle he was as privatdozent in Graz, where at that time Meinong was teaching. Meinong’s name appears for the first time in a note Lesniewski added to the Attempt, where he cites the second edition of Meinong’s Über Annahmen, but presumably Leśniewski knew Meinong’s ideas much before, for one of his teachers, Hans Cornelius, had discussed them in his Versuch einer Theorie der Existentialurtelle (1894). Well, one could hardly conceive of a more distant position from Meinong’s ideas than Leśniewski’s. That no object is a contradictory object is a metaphysical claim – which semantically expresses itself as: there are empty names – that one meets in all the works by Leśniewski, and ‘to be something’ and ‘to be a non-contradictory object’ appear for the latter to be one and the same thing, besides the ‘square circle’ is not a non-existing object: it is not an object at all. In Leśniewski, contrary to what Meinong was thinking, the totality of objects coincides with the totality of what is real or existing, hence to be an object, to be existing, to be something, to be an individual object, to be real, to have defined spatio-temporal dimensions are in the final analysis the same thing. In this perspective it has no sense to ask for a concrete proof of PC as distinct from a formal one, as Łukasiewicz did. Moreover, it was not by chance that Leśniewski included his critique against general objects in the Attempt (see S4). The nearest target of the critique was Twardowski, guilty for having enriched his ontology of such unlikely objects. If one thinks that in Twardowski general objects are nothing but special cases of contradictory objects, characterized both of them by the fact that they may be presented non-intuitively and indirectly and, furthermore, by their non-existence, the critique finds its natural place in the Attempt. Besides, the key passage in Leśniewski’s proof is S4, ii., in which Leśniewski shows that in order to build a general object from individual objects one should violate OPC, and since the latter is true, that construction is impossible. For this reason Leśniewski was not considering general objects to be objects violating the ontological tertium non datur. Undoubtedly it is true that – as Küng wrote – Leśniewski’s argument is applicable only to concrete objects, since an abstract object (a class, a universal idea) [...] cannot be defined as an object which possesses the properties of the concrete individuals subsumed under it, because an object must possess properties that are not assignable to any of the individual at issue. Anyway, on one hand ‘to be constructable from individual objects’ seems to be Leśniewski’s requirement for an object to be admitted in his universe, on the other hand Leśniewski’s aim, as a matter of fact, is precisely to exclude general objects from reality, just as there are not contradictory objects in the constructions of thought, of which – as to Łukasiewicz – Russell’s antinomy was a sample. But, according to Leśniewski, since there is only one ontological level and only one existence (spatio-temporal), to exclude something from

31 Cf. Łukasiewicz [1910c].
32 Cf. Łukasiewicz [1910a], p. 112 ff. (Germ. transl. p. 137 ff.).
35 Cf. Cornelius [1894] and Husserl [1896].
realities is to deny it *tout court*, for there is not any other world or realm where this something could be. It is easy to see how much Łukasiewicz does not agree with these ideas:

Logical and ontological principles are not only surer, but also more general than metaphysical principles; in fact they regard equally metaphysical beings, constituting the essence of the world (*istota*) as the objects of experience and creations of human intellect which do not really exist, in general everything that is something and nothing. If Aristotle's principle of contradiction is only a metaphysical law, then it would not be improbable as of now the assertion that its logical and ontological meaning is not great.39

The distinction Łukasiewicz draws between ontology and metaphysics, which seems to be a difference between “possible structures of beings [...] and the research on ontology as realized in ‘our world’”,40 is clearly rejected by Leśniewski. Leśniewski accepts the distinction between logical and ontological principles, but certainly for him there is not one between metaphysical and ontological ones: ontology and metaphysics are interchangeable names to speak of the system of the sentences about all the objects in general, where ‘object’ always stands for ‘existing object’. Leśniewski does not claim LPC to be equivalent with OPC “since they correspond to objective facts”. On the contrary, they are to be kept rigorously separated: an ontological principle is about all the objects in general, while a logical principle is about sentences, which are only some of the objects. For instance in the *Critique* it will be clear that the Ontological Principle of the Excluded Middle is true, but the Logical one is false. Leśniewski was to write that between ontological and logical principles there is a certain kind of ‘correspondence’, unfortunately not specified by Leśniewski better than it is (thanks to this particular sharing-out of ontological/logical, Leśniewski could theorize the idea of a hierarchy of languages, which in principle

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39 Łukasiewicz [1910a], p. 89, my emphases (Germ. transl. p. 110).
40 Wolenski [1987], pp. XXII–III. See also Meinong: “It may sound strange to hear that metaphysics is not universal enough for a science of Objects [...] Without doubt, metaphysics has to do with everything that exists. However, the totality of what exists, including what has existed and will exist, is infinitely small in comparison with the totality of the Objects of knowledge [...]”. cf. Meinong [1904], p. 486 (Engl. transl. p. 79).

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41 Lesniewski [1913b], p. 322 (Engl. transl. p. 54).
42 Cf. Wolenski [1987], p. XX.
43 Łukasiewicz [1910a], pp. 131–132 (Germ. transl. pp. 161–162). *La Science et la méthode* was first published in Polish in 1911. See also p. 8 above.
44 Cf. Wolenski [1987], pp. XXII.
And still in 1936 he was convinced that the choice at issue depended on experience. But perhaps the accent he put on the practical worth of PC drove Lesniewski to stress his distance from conventionalism, in any case. While it is easy to become aware of the fascination the parallel – to which he was to be faithful for many years – did not signify anyway a shift to ‘non-Aristotelian logic’, too. Lesniewski in this sense was very conservative, and that sort of old-fashioned flavour his logic emanates – entangled with remarkably modern and far-seeing peculiarities – is due to his faith to traditional logic. As clear from chapter XV of On the Principle of Contradiction in Aristotle, Łukasiewicz started in 1910 to get interested in the theoretical meaning of a system of non-Aristotelian logic, whose possibility was connected, as said previously, with the dethronement of PC from the royal chair of the Supreme Principle of Logic. One cannot evoke such matters without remembering that ‘non-aristotelian’ logic is linked not only with the debate on PC, but equally with that on the Principle of the Excluded Middle and the Principle of Bivalence, already noticed previously. Nevertheless, since the issue would deserve an entire paper, which should include at least Kotarbiński’s contribution, I will not consider it in detail. I will just recall some philosophical traits connected with non-bivalent logic which are strictly related to the points presented here. When Łukasiewicz announced the discovery of the three-valued system of propositional calculus, he emphasized that this system “has, above all, a theoretical significance as a first attempt to construct a system of non-Aristotelian logic”. As Jordan wrote, “whether it may be shown to have also a ‘practical significance’ cannot be decided until the consequences of the principle of trivalence are investigated in their relation to empirical knowledge [...] The question of the application of the trivalent system of logic, of finding a set of objects in which the axioms of this system are satisfied, is a distinct problem and independent of the theoretical discovery which should be judged by itself, irrespective of its application”. On this point Łukasiewicz and Lesniewski had the opportunity of showing in the clearest way their very different opinions. In 1938 Łukasiewicz delivered a lecture to the Circle of Scientists in Warsaw, “Genesis of three-valued logic”. Lesniewski took part in the discussion and his words are the sole evidence we have of his ideas on many-valued logics. Łukasiewicz outlined the discovery of trivalent logic saying among other things that the importance of polyvalent logic was overcoming that of non-Euclidean geometry, and that it showed that “non equivalent ways to speak of reality” were possible. The fundamental idea in the birth of three-valued logic was adding a third value to the matrix of bivalent logic, with the proviso of finding an intuitive interpretation of it. Without this, if there had not existed at least a shadow of possibility to interpret intuitively this third value, then trivalent logic would not have been born. The author would have been accused of having had a thought devoid of sense.

The interpretation Łukasiewicz had in mind was linked with Aristotle’s Perihermeneias and sentences on future contingent facts, that were in his view neither true nor false. Lesniewski contrasted this position as strongly as he contrasted Łukasiewicz’s non-existent objects in the Attempt. For him the third value had no sense, because “no one had been able until now to give to the symbol ‘2’ introduced in trivalent logic’s matrix any

46 Cf. ibid. and Łukasiewicz [1918].
49 Cf. Betti [1998a].
50 Cf. Kotarbiński [1913].
intelligible sense, which may ground this or that ‘realistic’ (rzeczywistościowej) interpretation of this ‘logic’”. Leśniewski declared never to have met in science any situation such as had required an integration of ordinary calculus of propositions that followed from the introduction of any third logical value in arguments. Leśniewski was arguing that any ‘intensional function’ such as, for instance, ‘is possible that P’ had to be de-intensionalized in order to be examined on the basis of extensional and bivalent logic, since he did not know any system of intensional logic that on his opinion was satisfactory. Łukasiewicz’s answer was particularly meaningful: he explained his end had been to build a system of pure logic without consideration for the applications it could have, although remarking his feeling obliged of giving an intuitive interpretation of it. Finally, Łukasiewicz disclosed the real issue of the disagreement with Leśniewski, that is indeterminism and Principle of Causality:

If there existed in the world an omniscient man [...] he could not infer, basing himself on the laws of nature, that tomorrow there will or not will be a sea battle, if it were not conditional already now; besides, he could not state if such a battle took place in the past, if its consequences had not lasted till now. At that moment, thus, the sea battle passes into the ‘realm of possibilities’, and this is not because we do not know anything about it, but because this is just the structure of the world.v

Here I am obliged to leave out of my account a lot of things, Leśniewski’s views on the subject included, which are chiefly contained in his “Is Truth only Eternal or is it also Sempiternal?”; I limit myself to remark that the most important point in this respect is once more an exclusively ontological controversy: for Leśniewski there are not indeterminate sentences6 in the structure of the world which symbolize undecided facts as future contingent ones – which, furthermore, are not contingent at all. In Leśniewski objects seem to be set up ab aeterno in space and in time:

it is already now true that [...] I shall choose this rather than another profession, that of two crossroads I shall take the right rather than the left one, that at a given moment a certain thought will cross my mind as sum-

55 Łukasiewicz - Smolka – Leśniewski et al. [1939], pp. 239-240.
56 Cf. the proof against them in Leśniewski [1913b], pp. 350-352 (Engl. transl. p. 85).
57 Łukasiewicz [1913a], pp. 514-515 (Engl. transl. p. 103, reproduced with slight changes).
59 Cf. Leśniewski [1916], pp. 5-7.
principle of excluded middle on the basis of the convention which he called 'The Restricted Principle of the Excluded Middle', i. e.

RTND A sentence with denotative subject and connotative predicate is true if and only if its singular contradictory is false, which was already elaborated in the Attempt. In the Critique Leśniewski quotes a paper by Leon Chwistek, “The principle of contradiction in the light of Bertrand Russell’s more recent inquiries” (1912), and, indeed, in the Critique seems to take most of the materials from Chwistek’s paper as a starting point of his analysis. The important issue for the present ends in the Critique is the treatment of sentences with empty subjects: given Leśniewski’s theory of truth from which RTND stems, antinomies like Nelson-Grelling’s or Meinong’s Paradox could be solved simply by showing that the sentences which contradict themselves are both false, that means by showing that their subjects are empty. Leśniewski considers a series of antinomies which not only are exactly the antinomies Chwistek presents in his paper, of which the last and the most important is Russell’s one, but even the pages of the works quoted by Leśniewski are the same quoted by Chwistek. Although there would be a lot of important things to notice about the remarkably pioneering solution of Epimenides’ Paradox, I should notice only that Leśniewski solved it more or less in a similar way, putting in addition a restriction to connotative self-referential names. Well, the impression one has in reading Leśniewski’s Class of Classes is that it is actually the last chapter of the Critique published separately. Leśniewski’s approach to Russell’s Antimony is the same as all the others solved in the Critique: he tried to show that the Antinomy was based on sentences with empty subjects. The brand new fact was that in this case it was not enough to restrict the expressive power of language, as in the solution of Epimenides’ paradox, though very brilliant. To show that ‘the class of classes not subordinated to themselves’ was an empty expression required to specify which kind of object was understood by ‘class’. And that was the birth of Mereology. So Łukasiewicz was an important source for Leśniewski’s approach to formal logic, but one should also consider the importance Chwistek’s paper had in this respect, and first of all one should not despise the idea that it was Leśniewski’s conviction that there were not contradictory objects in the one world there was that gave rise to Mereology.

Bibliography

Batóg, Tadeusz – Murawski, Roman

Betti, Arianna

Casari, Ettore

Chwistek, Leon

Coniglione, Francesco – Poli, Roberto – Woleński, Jan (eds)

Cornelius, Hans

Husserl, Edmund

Jordan, Zbigniew

Kotarbiński, Tadeusz

Küng, Guido

Łukasiewicz and Leśniewski on Contradiction

Łukasiewicz, Jan


Łukasiewicz, Jan - Smolka, Franciszek - Leśniewski, Stanisław et al.


Meinong, Alexius


Rand, Rose


Simons, Peter M.