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ONTOLOGY AND THE LOGISTIC ANALYSIS OF LANGUAGE

An Enquiry into the Contemporary Views on Universals

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8. STANISŁAW LEŚNIEWSKI

Russell, and initially also Carnap, unhesitatingly accepted references to abstract entities. Wittgenstein did not touch the question at all, since his ideal language says nothing *about* properties and relations, these being merely *pictured*. Leśniewski, on the other hand, regarded abstract entities as problematical from the very beginning.

Indeed, in his pre-logistic period he formulated a strict proof to the effect that there cannot be a "general object", since such an object would be contradictory. In place of the theory of classes he developed a system of the part-whole-relation, *mereology*, where reference is made only to concrete objects. Similarly, Leśniewski did not accept the predicate calculus of modern logic, constructing instead a system according to his own intuitions, the so-called "*ontology*". Although his "ontology" is comparable with the simple theory of types, it seems that it cannot be considered as committed to the explicit assumption of abstract entities. The names of the system are merely said to stand for several individuals, for one individual, or for none, and the functors are not considered as naming anything. Leśniewski has a highly original conception of the quantifiers, which differs considerably from Frege's and Russell's.

Leśniewski aimed at a system free from any non-logical presuppositions. In his view a logical system should be entirely neutral, since it should provide the framework for the formulation of all possible kinds of theories. T. Kotarbiński, however, based his explicitly metaphysical theory of so-called *reism*, according to which only things exist and nothing else, on Leśniewski's system. The question therefore arises whether and to what extent Leśniewski's system can be called "nominalistic".[1]

[1] Because of the unusual character of Leśniewski's system and the limited number of written sources, the author is especially indebted to the following disciples of Leśniewski: B. Sobociński, C. Lejewski, H. Hiż, as well as to Lejewski's disciple E. C. Luschei, and wishes to thank them for their willingness to anwer his questions and to provide him with valuable information. See also footnote 28 on p. 109 below.

8.1 The contradictory nature of so-called "general objects"

Like Russell and later Quine, Leśniewski concerned himself in his early writings with the problems connected with existence statements. His initial conclusions, however, were odd and not very useful. Thus in his first paper he interprets Mill's terminology of denotation and connotation in such a way that all negative existence statements turn out false.[2] Later he went still further, and considered all positive existence statements to be likewise false.[3]

Leśniewski explicitly dissociated himself from these early works, when he began to construct logistic systems, and admitted the "bankruptcy of their "philosophico-grammatical approach".[4] He retained only one proof from his pre-logistic period: that of the impossibility of assuming a so-called "general object" (*przedmiot ogólny*).[5] A "general object" is defined as an object that possesses those and only those properties that are common to all the individual objects corresponding to it. Suppose that A is a property common to some but not to all the individual objects in question; then by definition the corresponding "general object" cannot possess the property A. But neither can it possess the property of not possessing A, i.e., it must possess A, which is contradictory to the above. It follows that there can be no "general object".

This proof assumes the principle that "For each property it holds that every object either possesses or does not possess it", which excludes any indeterminateness in the object. Leśniewski calls this principle the *metaphysical* or *ontological* principle of the excluded middle, and distinguishes it from the *logical* principle of the excluded middle, which he formulated: "At least one of two contradictory propositions must be true." This distinction between the ontological and the logical, is indicative of the precision with which Leśniewski expresses himself – very much in contrast to Russell.[6]

[2] Leśniewski 1911; he obtained his Ph.D. for it in 1912 under K. Twardowski at Lwów University. Cf. Mill 1843, vol. 1, ch. 2, § 5.
[3] Cf. Leśniewski 1913. We shall return to this point below, p. 121.
[4] Leśniewski 1927–1931, vol. 30, p. 183. They are, however, still worth reading for the precise and effective reasoning which they contain.
[5] Leśniewski 1913, pp. 7–8. Cf. Luschei 1962, pp. 308–310.
[6] Leśniewski 1913 considered the metaphysical principle to be true, but he believed

Let us add at once some words of criticism. Leśniewski's argument against "general objects" holds if these are defined as above, i.e., if they are regarded to be exactly like concrete objects. However, an abstract object (a class, a universal idea, that is to be exemplified in many individuals) must be something quite different. It cannot be defined as possessing the properties of the concrete individuals subsumed under it, for it must possess properties that cannot be attributed to any of the individuals in question: it is abstract, timeless, exemplified in such-and-such a number of individuals, etc. The properties that are common to the individuals subsumed under it, belong to the abstract object not as *properties*, but as *characterizing marks* (Latin: *notae*, German: *Merkmale*) which indicate what kind of individuals fall under it.

It is interesting in this connexion to consider the classical "third man" objection that has been raised against Plato's doctrine of ideas.[7] If the idea of man is introduced in order to explain the similarity between individual men, and if this idea is taken as being itself similar to individual men, then in strict logic a second idea of man (a higher-order idea), i.e., a "third man", would have to be introduced to mediate between any individual man and the first-order idea of man; and so on *in infinitum*. – It is therefore important to stress that normally an idea does *not* have properties similar to those of the individuals subsumed under it. Stegmüller, for example, rightly says: "The idea of redness is not itself red, the class of red things is not itself a red thing."[8] It is mistaken to think of an idea as of a picture, as if it were another concrete object, which shares properties with what it pictures.

The distinction between properties and characterizing marks of abstract objects is an old one. In modern logic it is made, e.g., by Frege, who refers to the properties (*Eigenschaften*) and the characterizing marks (*Merkmale*) of objective concepts (*Begriffe*).[9] R. Ingarden has given a detailed phenomenological description of this special dual structure of

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that the logical principle was false, since he held that all positive as well as all negative existence statements were false. Cf. how Łukasiewicz 1910, too, had distinguished between the ontological and the logical principle of contradiction.

7 Plato, *Parmenides* 132A–133A; Aristotle, *Met.* A9 990 b 18, M4 1079 a 13.

8 Stegmüller 1956, p. 204.

9 Frege 1884, p. 64.

ideas within the framework of a philosophical ontology.[10] He shows how the universality of an abstract object is explained by the fact that its characterizing marks include variables as well as constants. Thus, for example, it is part of the idea of man that man has size, hair-colour, and so on; on the other hand, in the universal idea the precise determination of the size, the hair-colour and so on, is left open. The properties of an idea, however, are in no way indeterminate: if an idea is to be regarded as an object then it must have a closed structure. Thus the *tertium non datur* holds for the properties of abstract objects (though not for their characterizing marks) without producing any paradox. Leśniewski's argument therefore fails if abstract objects are conceived in this way.

The metaphysical question nevertheless arises whether there are in fact objects with such a dual ontological structure; whether the existence of such entities can be assumed.

8.2 Mereology

Because of the inaccuracy of Russell's formulations, mathematical logic at first seemed unintelligible to Leśniewski. Already in 1911, J. Łukasiewicz, who was then "Privatdozent" at Lwów University, had drawn his attention to mathematical logic. But even Łukasiewicz could not give an exact meaning to Russell's explanations concerning the antinomies, and Leśniewski therefore directed his attention instead to the study of J. S. Mill and Husserl.[11]

In 1914, however, he became interested in the foundations of mathematics, and tried to find his own solution to the antinomies of the theory of classes.[12] The result was a new and special theory. No antinomies occur in it, as it does not deal with genuine classes, but only with concrete entities: instead of references to abstract classes it contains references to concrete collective totalities, to "wholes".

As Leśniewski sees in these concrete totalities one possible explication of what the much-used word 'class' may indicate, he applies the designation 'class' to them despite their difference from the entities of the traditional

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10 Ingarden 1948, ch. 11; the essentials can already be found in Ingarden 1925.

11 Leśniewski 1927–1931, vol. 30, p. 165 f.

12 Leśniewski 1914; the first axiomatisation of mereology is given in Leśniewski 1916.

calculus of classes.[13] In order to avoid confusion we shall in the following add the index 'L' to the words 'class' and 'member', when used with reference to concrete totalities in Leśniewski's sense.

Leśniewski's theory is distinguished from the ordinary calculus of classes by a number of special features. For example, whereas a sphere, the class of its halves and the class of its quarters, would normally be regarded as three different entities, on Leśniewski's view a sphere is identical with the class$_L$ of its halves and the class$_L$ of its quarters. The sentence that a half is a member$_L$ of the class$_L$ of quarters is true.[14] Thus a member$_L$ of the class$_L$ of objects of type A need not necessarily be an A. In contrast to the classical class-member relation, Leśniewski's class$_L$-member$_L$ relation is transitive: if X is a member$_L$ of the class$_L$ of objects of type A, and if the class$_L$ of objects of type A is a member$_L$ of the class$_L$ of objects of type B, then X is a member$_L$ of the class$_L$ of objects of type B. The expressions 'the class$_L$ of objects of type A' and 'the class$_L$ of the class$_L$ of objects of type A' have the same designation, viz. the collective totality of all A's.[15] A unit-class$_L$ is identical with its member$_L$, and there is no mereological null-class$_L$.[16] Leśniewski's theory is akin to a generalized Boolean algebra without null element.[17]

Leśniewski was aware of the non-traditional nature of his "theory of classes$_L$". He referred to it as the doctrine of part-whole relations, and gave it the special title of '*mereology*' after the Greek word for 'part': 'μέρος'.[18] From a philosophical point of view, an essential feature of his theory is that it extends the notion of an object. A collective totality – a concrete "heap", as Quine was to say later[19] – counts as one concrete object in the same way as any component part that may be "cut out" of it. The components of a "heap" need not "hang together"; for example, all the cats in the world at the present moment together form *one* such heap, and can be designated as *one* object in this sense. Furthermore mereology can also be applied to non-material objects. If there are

[13] For a further explication cf. below, pp. 108 ff.
[14] Leśniewski 1914, p. 66.
[15] Leśniewski 1914, p. 69.
[16] Leśniewski 1927–1931, vol. 30, p. 187, p. 186.
[17] Cf. Tarski 1935a.
[18] Leśniewski 1927–1931, vol. 30, p. 165.
[19] Quine 1953, p. 114.

angels, then we can speak, e.g., of the mereological whole of all angels.

In 1926 Tarski drew Leśniewski's attention to the similarity existing between his mereology and Whitehead's theory of events.[20] Whitehead, too, refers to part-relations; one event can be part of another; two events can overlap. In the United States, mereology is known as the "calculus of individuals" – a designation that is etymologically somewhat paradoxical, since the objects of mereology are anything but indivisible *individua*. It was developed there independently of Leśniewski by N. Goodman and H. S. Leonard around 1930.[21] J. H. Woodger, the English biologist, constructed his own, similar theory and applied it to biology.[22]

It is not surprising that interest in mereology should have developed independently in different parts of the world. This is readily explained by the nominalistic trend in contemporary philosophy: mereology, the theory of concrete totalities, can in many cases be applied in place of the theory of classes, which makes explicit reference to abstract objects.[23] Unfortunately Leśniewski's work, the first in the field of mereology and the most detailed and precise, remained largely unknown outside Poland until 1937, when Tarski brought it to the attention of a wider public.[24] Leśniewski's theory is being developed further by B. Sobociński and C. Lejewski; and we look forward to the publication, in due course, of a detailed monograph on mereology.[25]

[20] Leśniewski 1927–1931, vol. 31, p. 286. Cf. Whitehead 1919. Already in 1902, in a letter to Russell (dated 28th July, quoted in Bartlett 1961, pp. 43–44) Frege emphasized the distinction between a whole and a class and described it in clear terms. Frege, however, did not construct a calculus of part-whole relations.
[21] However, the calculus of individuals was not published until 1940 in Leonard-Goodman. For evidence of the earlier origin of the work, cf. Goodman 1951, footnote p. 42. It is possible that Whitehead's ideas partly inspired the work: he was teaching at Harvard at the time, with Leonard working under him.
[22] Cf. Woodger 1937.
[23] On these possibilities and their implications, cf. in particular Goodman-Quine and Goodman 1951. We shall give a detailed account of the American "nominalists" in the next chapter.
[24] In Woodger 1937, where Tarski gives a simplified version of mereology in an appendix. Tarski had already based his paper Tarski 1929 on a special formulation of mereology.
[25] A book by Sobociński on mereology has for some time been announced in the series "Studies in Logic" (Amsterdam). Cf. the papers Sobociński 1954/55; Lejewski 1954/55; Lejewski 1955/56; Lejewski 1963a, and the dissertation Clay 1961.

8.3 Ontology$_L$

8.31 *The distributive conception of totalities*

On Leśniewski's view membership in a concrete totality can be expressed not only in terms of mereology, by saying that something is a part of a collective whole: a whole can also be conceived distributively.[26] In order to gain a clearer idea of the meaning of the collective-distributive distinction, let us consider the following sentences[27]:

[1] 'Socrates is a component part of the concrete totality formed by all mortals',

[2] 'Socrates is a component part of the concrete totality formed by all Greek tribes';

or using the terminology of 'class' and 'member':

[1′] 'Socrates is a member of the class of mortals',

[2′] 'Socrates is a member of the class of Greek tribes'.

Evidently, [2′] is equivalent to the true sentence [2] only if 'member' and 'class' are understood mereologically. Strictly, we should have to write:

[2′] 'Socrates is a member$_L$ of the class$_L$ of Greek tribes'.

On the other hand, [1′] is true even according to the ordinary theory of classes.

On Leśniewski's view there is a further important distinction between [1′] and [2′]: in [1′] the words 'class' and 'member' are eliminable; the sentence can be re-formulated as:

[1″] 'Socrates belongs to the denotation of 'mortal'',

[1‴] 'Socrates is a mortal being',

or simply:

[1⁗] 'Socrates is mortal'.

[26] Cf. in particular SOBOCIŃSKI 1954/55, p. 2; also SOBOCIŃSKI 1949/50, p. 239 f.; KOTARBIŃSKI 1929, p. 13.
[27] We have formulated [1], [1‴], [2], and [2′] ourselves; [1′], [1″] and [1⁗] can be found in SOBOCIŃSKI 1954/55, p. 2.

That is, the class-member relation in [1′] can be rendered by the logical copula 'is'; no special non-logical functor like 'part of' need be introduced, as in mereology. Here, then, we have a second explication of the concept of class. This is the so-called "distributive conception". The "class", the concrete totality, is regarded as made up of certain concrete component parts: as "distributed" in a specific way.

The laws holding for distributive wholes are different from those holding for the collective wholes of mereology. Leśniewski thus had to develop another new theory, to which he gave the name '*ontology*', since it is the theory of the copula 'is'. In order to avoid confusion with the philosophical discipline of ontology, we shall refer in the following to Leśniewski's theory by means of the name 'ontology$_L$'. There is, in fact, a connexion between ontology$_L$ and ontology, in that Leśniewski believed that his ontology$_L$ realized the aristotelian project of a "first philosophy", i.e., of a completely general theory of objects.[28]

Leśniewski believed that the antinomies which Russell had discovered,

[28] KOTARBIŃSKI 1919, p. 254. LEŚNIEWSKI developed his ontology$_L$ after the mereology; systematically, however, ontology$_L$ is prior to mereology. Whilst working on the *mereology* (1914–1917), it became clear to Leśniewski that he needed a formalized logic which corresponded to his intuitions. He therefore developed a theory of names, the *ontology$_L$* (1919–1921), and finally a sentential calculus with quantifiers and variable functors, the *protothetics* (1923). Systematically the protothetics comes first. It is presupposed by ontology$_L$; and mereology presupposes the two theories of protothetics and ontology$_L$. In contrast to protothetics and ontology$_L$, mereology is not a part of logic. It contains, as we have seen above, a special non-eliminable functor which is non-logical, and with the aid of which the proper name of an individual object, viz. the name 'universe', can be defined (SOBOCIŃSKI 1954–1955, p. 2, p. 5; LEJEWSKI 1957, p. 255).

Leśniewski developed a special symbolism for his system, which he axiomatised. As a result of his own efforts and the research of his pupils, the number of axioms has been reduced to three: one for each theory (cf. SOBOCIŃSKI 1949/50, p. 257; SOBOCIŃSKI 1960/61; and LEJEWSKI 1963a).

Leśniewski's system is more precise and simpler than that of *Principia*, the second edition of which appeared in 1925; but as Leśniewski published so very little, his work has had no direct effect outside Poland. It was not until 1929 and 1930 that two articles of his appeared in German; and of LEŚNIEWSKI 1938 and LEŚNIEWSKI 1938a only a few copies of special reprints were distributed. However, through his teaching at the University of Warsaw, where he was professor of mathematics from 1919 until 1939, Leśniewski has exerted a decisive influence on the logicians of the Polish School.

To-day the only book on Leśniewski is LUSCHEI 1962. Further material can be found in the publications of Kotarbiński and of Leśniewski's disciples Lejewski, Słupecki, Sobociński and Tarski. See also Clay, Grzegorczyk (but cf. the criticism of LUSCHEI 1962, pp. 154–166), Jordan, Kearns, Prior, Sinisi.

could be explained as arising from a confusion of the collective and distributive conceptions of a "class".[29] The sentence:

[3] 'Every member of the class of objects of type A, is an A',

which is characteristic of the theories in which the antinomies had occurred, is tautologically true on a distributive interpretation of the word 'class':

[3′] 'Whatever is A, is A'.

On the other hand, on a collective-mereological interpretation it results in the false sentence:

[3″] 'Every member$_L$ of the class$_L$ of objects of type A, is an A.'

The two interpretations must not be confused.

Like mereology, ontology$_L$ differs from ordinary class calculi. Its sentences are based on the schema '*A est B*'[30], which can be read: 'A is B', 'A is a B', 'A is one of the B's', 'A is a member of the distributive class of B's'. The distributive class of B's is for Leśniewski not an abstract entity, but like the mereological whole of the B's, it consists of the B's.

Of course, it may happen that for a given 'B' there is exactly one object which is a B. For example, if 'B' is an abbreviation for 'moon' (this word being taken in its most ordinary sense as applying to the natural satellite of the earth), then the B's are identical with this one B, i.e., the distributive class is identical with its only member. In this case '*B est B*', i.e., '*B* is one of the *B's*' ('The moon is one of the moons') is true. The functor '*est*', the *copula* of ontology$_L$, unlike the membership relation of a class calculus based on the theory of types, is thus not irreflexive.

If 'A' and 'B' are two terms which apply each to exactly one, and both to one and the same object, then '*A est B*' is true. If furthermore '*B est C*'

[29] Sobociński 1949/50, p. 239 f.
[30] This is the notation used in Kotarbiński 1929. His exposition of ontology$_L$ has the virtue of being readily intelligible, and has the explicit approval of Leśniewski (Leśniewski 1927–1931, vol. 34, p. 160). Leśniewski's notation is '$\varepsilon\{Ab\}$'. This is more complicated, and the use of *epsilon* is liable to cause confusion since it is customarily used to designate the membership-relation of ordinary class theory. On Leśniewski's distinction between capital and small letters cf. below, p. 113, footnote 41. In order to facilitate understanding, we will use neither Leśniewski's nor Kotarbiński's special notation for quantifiers and sentential connectives, but render these in the usual peano-russellian symbolism.

is true, then '*A est C*' is true. Thus unlike the membership relation of a class calculus based on the theory of types, the functor '*est*' is not intransitive. (In fact, it is transitive: in *all* cases in which formulas of the form '*X est Y*' and '*Y est Z*' are true, the formula of the form '*X est Z*' is true, too.)

If the term 'B' happens to be an empty term which applies to no object, i.e., if there are no B's, then we may say that "the class of the B's is an empty class". There is then nothing in reality corresponding to 'B', but there still is the term 'B'. Therefore, while there simply is no mereological null-class$_L$, "there are" in some sense "null classes" in ontology, namely in the sense that there are empty terms. If 'B' in '*A est B*' is an empty term, then A cannot be one of the B's and '*A est B*' is certainly false. Also if 'A' is an empty term, then it is false to say that A is one of the B's, no matter what the B's are. Thus one might not only say that in ontology$_L$ "null classes do not have members", but also that "null classes are not members of any class".

8.32 *Shared, unshared and fictitious names*

However, to speak in the above way in terms of classes is more misleading than illuminating. The arguments 'A' and 'B' in '*A est B*' are not considered as proper names of classes, but rather as referring to concrete individual objects. They are usually called "names"; however, the word 'name' is here not used in the narrow sense of "genuine name proper to exactly one entity", but in the broader sense of "term". Ontology$_L$ is a calculus of names (*rachunek nazw*)[31], where one name may refer to several objects, to exactly one, or to no object: i.e., to use J. H. Woodger's terminology, it deals with shared, unshared and fictitious names.[32]

From the point of view of logic, this division of names is not to be regarded as basic, since it depends on the factually existing state of the world. Leśniewski therefore puts all names into the same semantical category.[33] His ontology$_L$ resembles in this respect scholastic logic, where

[31] Kotarbiński 1929, p. 227.
[32] Cf. Woodger 1952, p. 196; Lejewski 1957, p. 240; Lejewski 1958, p. 154.
[33] In contrast to Russell's, Leśniewski's metalogical formulations are extremely precise (cf. above, p. 78 f. and p. 103 f.); in fact, he developed an explicit metalogical system. He was inspired by Husserl's doctrine of the *Bedeutungskategorien* in *Logische*

it is also the case that all terms, singular as well as general, belong to the same category.[34] Leśniewski does not distinguish between names which in a *meaningful* sentence can stand *before* '*est*', and those that can stand *after* '*est*'; every name can stand in each of these places.

This peculiarity distinguishes the ontological$_L$ sentences of the form '*X est Y*' from the sentences of modern predicate calculi, where equal signs can never stand both in the subject and in the predicate place of a meaningful sentence, but where the syntactical categories of individual names and of predicate designations are always kept strictly apart.[35]

It is probably not a coincidence that ontology$_L$ has been developed by a Pole; for Polish, like Latin but unlike English (or German, French, Italian, Spanish) has no indefinite article, so that the same grammatical form applies to the predications of common nouns and to identity sentences. For example, '*Sokrates jest człowiekiem*' ('*Socrates est homo*') is constructed in the same way as '*Sokates jest Sokratesem*' ('*Socrates est Socrates*'), whereas in English the forms of 'Socrates is *a* man' and 'Socrates is Socrates' are different.[36]

A further peculiarity of the russellian systems has to be mentioned: the individual names of a meaningful sentence are normally not allowed to be empty, only predicates may be "fictitious", i.e., may apply to no

Untersuchungen and referred to the categories as *semantical*, not as syntactical categories of signs. For although his theories are presented as strictly formal calculi, so that sign-categories can be determined purely in terms of syntactics, he nevertheless attached great importance to the intuitive interpretation, to the semantical dimensions of his system, which he wanted to be more than a mere formalism (cf. LEŚNIEWSKI 1929, p. 6, p. 78; see also LUSCHEI 1962, § 4, for a detailed discussion of this aspect). Later, however, after Leśniewski, the designation 'syntactical category' became prevalent. Cf. TARSKI 1935, p. 335 f.; ADJUKIEWICZ 1935; BOCHEŃSKI 1949. See also below, pp. 123 ff.

34 For the relation between syllogistics and ontology$_L$ cf. LEJEWSKI 1963.

35 Although the distinction between terms under which falls exactly one individual and terms under which fall several individuals depends on the factual state of the world, it is still possible to make a distinction between individual names and predicate signs, which is not accidental. For every predicate *can* (logical possibility) apply to several individuals (and a non-atomic predicate *can* refer to no individual) even if, like the predicate 'is a natural satellite of the earth', it refers *de facto* to exactly one individual; while on the other hand, every individual name can only refer to a single individual. Cf. FREGE 1884, p. 63; see also LEWIS 1944, p. 239; LEWIS 1946, p. 45, who makes the intensionality of his distinction between singular and general terms explicit.

36 To be precise, in ontology$_L$ the English sentence 'Socrates is Socrates' can be rendered in two different forms: either as the predication 'Socrates *est* Socrates' or as the identity sentence 'Socrates=Socrates', where '=' is defined: $(X)(Y)\ (X{=}Y \equiv X\ est\ Y \cdot Y\ est\ X)$.

individual. The arbitrariness of this exclusion of empty individual names has been compared with the arbitrariness of the exclusion of empty terms in Aristotle's syllogistics, and some authors have proposed systems of so-called "free logic", i.e., of predicate logic in the russellian style but admitting empty individual constants.[37]

Whereas on Leśniewski's view the *meaningfulness* of a sentence does not depend on how many objects are subsumed under the names contained in the sentence, this factor is vitally important in determining the *truth or falsity* of sentences. For instance, as we have seen above[38], if either '*A*' or '*B*' (or both) is an empty name, then '*A est B*' is false. Leśniewski also requires that '*A*' must not be a shared name. He interprets the sentence '*A est B*' explicitly as saying: "Every *A* is *B* and at most one object is *A*".[39] In a *true* sentence, therefore, the name standing *before* '*est*' must always be an unshared name or a description of a single actually existing object.[40] Thus, while from the rules of formation for meaningful sentences we cannot learn which names are in fact proper to a single individual, we can find this out by investigating which names occur in the subject place of *true* ontological$_L$ sentences of the form '*X est Y*'.[41]

The one axiom of ontology$_L$ guarantees these truth conditions by stipulating:

$$(X)(Y)\{X\ est\ Y \equiv (Z)(Z\ est\ X \supset Z\ est\ Y) \cdot (\exists Z)\,(Z\ est\ X) \cdot (Z)(W)(Z\ est\ X \cdot W\ est\ X \supset Z\ est\ W)\}$$

37 Cf. LEONARD 1956 (cf. CHURCH 1963); HINTIKKA 1959; HINTIKKA 1966; LEBLANC-HAILPERIN and the papers by K. LAMBERT. The term 'free logic' has been coined by LAMBERT 1958–1964, vol. 13, p. 52. Although these systems allow individual names to be empty, they nevertheless retain the russellian type of quantification (see below, p. 117 f.).

38 Cf. above, p. 111.

39 LEŚNIEWSKI 1927–1931, vol. 34, p. 164. Leśniewski does not say "Every *A* is *B*, and exactly one object is *A*", since for him "Every *A* is *B*" already implies that at least one object is *A*.

40 Already LEŚNIEWSKI 1913, p. 13, had assumed that every sentence whose subject designates nothing (as, e.g., in the case of 'centaur', 'square circle', etc.) is a false sentence.

41 SOBOCIŃSKI 1949/50, p. 98f. Leśniewski distinguishes unshared names from shared names in his notation by using capital and small letters. But the fact that Kotarbiński omits this notational distinction in his exposition of ontology$_L$ shows that it is not essential to the system, and that all names belong to one and the same syntactical category. However, already the introductory axiom of a name constant may specify that it is an unshared name.

i.e.: 'For all X and for all Y: Z is Y if and only if (a) it is true for all Z that if Z is X, then Z is also Y; and (b) it is true for at least one Z that Z is X; and (c) it is true for all Z and for all W that if Z is X, and W is X, then Z is W'.[42]

Since the characteristic of being an object is not *shown* by a special syntactical category (i.e., by a category to which all proper names would belong) the ontological name 'object' occurs in Leśniewski's theory like any other name. Symbolically it is written 'V', being the most general name. Ontology$_L$ therefore seems eminently suited to be the language of the philosophical discipline of ontology. The name 'object' can be defined in purely logical – or rather: ontological$_L$ – terms:

$$(X)\,(X\ est\ \mathsf{V} \equiv X\ est\ X),$$

i.e.: 'For all X: X is an object if and only if X is X'; or alternatively:

$$(X)\,\{X\ est\ \mathsf{V} \equiv (\exists Y)\,(X\ est\ Y)\},$$

i.e.: 'For all X: X is an object if and only if it is true for some Y that X is Y'.[43] And the predication of the name 'object' is not trivial, for in ontology$_L$ a sentence of the form of the definiens 'X *est* X' is not always true, i.e.,

$$(X)\,(X\ est\ X)$$

is false.[44] So there is no temptation to believe, with Wittgenstein and Carnap, that "object" is a mere "pseudo-concept".

It is also possible to define a name which is necessarily empty, viz., the name 'contradictory object' (symbolically: 'Λ'):

$$(X)\,(X\ est\ \Lambda \equiv X\ est\ X \cdot \sim X\ est\ X),$$

i.e.: 'For all X: X is a contradictory object if and only if it is true that both X is X and X is not X'.[45] As the definiens is clearly contradictory, the

42 Leśniewski 1927–1931, vol. 34, p. 158; Kotarbiński 1929, p. 227.
43 Sobociński 1949–1950, p. 248.
44 See below, that 'Λ *est* Λ' is logically false.
45 Sobociński 1949–1950, p. 248. Cf. Prior 1953. The condition 'X *est* X' in the definiens is necessary in order that the definition be well-formed. The formula '$(X)(X\ est\ \Lambda \equiv \sim X\ est\ X)$' would be a logically false sentence, since for any empty name or for any shared name in the place of 'X', the form 'X *est* Λ' becomes a false sentence and '$\sim(X\ est\ X)$' becomes a true sentence.

following holds:

$$(X)\,(\sim X\ est\ \Lambda).$$

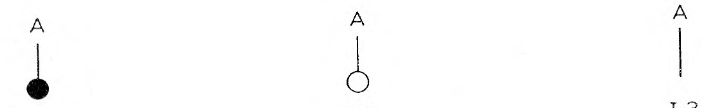
Even 'Λ *est* Λ' is an *a priori* false sentence, since 'Λ' is not the proper name of any individual object.

8.33 *Functors and existential import*

In our above exposition we have presented ontology$_L$ as the theory of the functor '*est*', since the theory did in fact develop out of an analysis and explication of the copula. It is, however, also possible to base the theory on different functors.[46] For, from a completely general point of view, ontology$_L$ is nothing else but a calculus of names; a theory of the different sentential forms, viz., of the different possible relations, which can hold in a sentence between the names in view of their respective extensions.

Leśniewski's theory thus continues the tradition of the scholastic logic of supposition[47], with the important difference that it does not analyze the suppositions of the names of a previously existing language (e.g., of scholastic Latin), but instead – and this is one of the characteristics of contemporary logic – orders and classifies the relations within the consistently structured system of an "artificially" constructed language.

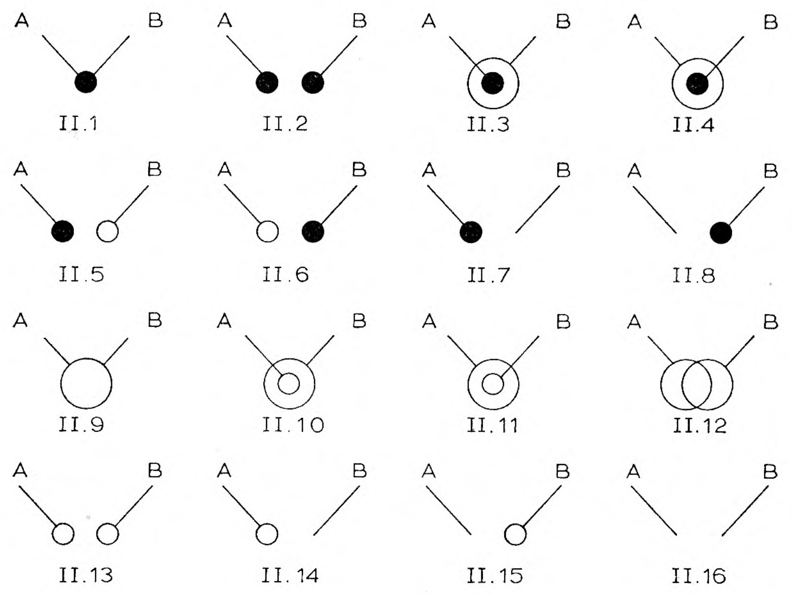
Taking into account the three cases of a name being a shared, an unshared or a fictitious name, 16 different situations can occur with respect to the extensions of two names 'A' and 'B'. Lejewski has put together a table of diagrams.[48] The three types of names are symbolized as follows:



I.1. Unshared name | I.2. Shared name | I.3. Fictitious name

46 Cf., e.g., the various axioms in Lejewski 1958, p. 164f.
47 See below, p. 121. Leśniewski, however, does not discuss his medieval antecedents.
48 Lejewski 1958, p. 155.

Then the 16 possible combinations are the following:



Every ontological$_L$ functor selects a certain number of these situations, in the sense that an atomic sentence in which it occurs is true if and only if one of the selected situations exists in reality. Thus the functor '*est*' is defined in such a way that '*A est B*' is true if and only if situation II.1 or II.3 exists in reality.

As already mentioned, it is possible for a name, such as 'centaur', to be fictitious. Whether a sentence has existential import, i.e., asserts the existence of objects, is determined in this theory *not* by the *names* but by the *functor*. Thus, for example, we know that every true atomic sentence containing the functor '*est*' presupposes the existence of an individual object, i.e., that this functor has existential import. The following one-place functors can be rendered in ordinary language by 'exists' [49]:

[49] Cf. Lejewski 1958, p. 158. In the usual russellian type of system there are no such functors and there are no formulas at all which would correspond to singular existence statements. See below, p. 128.

'*ex* (A)' is true if and only if situation I.1 or situation I.2 occurs; it can be read: "There is at least one A." [50]

'*sol* (A)' is true if and only if situation I.1 or situation I.3 occurs; it can be read: "There is at most one A."

'*ob* (A)' is true if and only if situation I.1 occurs; it can be read: "There is exactly one A." [51]

It is of course also possible to define functors without existential import: for example, a one-place functor that forms a true sentence if and only if situation I.3 occurs, or a two-place functor that forms a true sentence if and only if situation II.16 occurs.

8.34 Quantifiers without existential import

The fact that in ontology$_L$ names have no existential import, also affects the interpretation of quantifiers. The particular quantifier, which ordinarily is referred to as the "existential quantifier", asserts here nothing about the existence of objects. Thus, for example, from the factually true sentence

[1] $\sim ex\ (Pegasus)$

or from the logically true sentence

[2] $\sim ex\ (\Lambda)$

we can infer:

[3] $(\exists X)(\sim ex\ (X))$.

[3] is not to be read: "There is an object that does not exist", but simply: "Something does not exist", or more explicitly: "It is true for some X that X does not exist", where the variable 'X' does not extend over a range of *objects* but over a range of *names*.

From the point of view of a frege-russellian system [52], Leśniewski's

[50] '*ex*(A)' is true if and only if 'A' is a non-fictitious name. But '*ex*(A)' is not a sentence *about* names. Compare with what is said (below, p. 118) about Leśniewski's interpretation of the existential quantifier.

[51] Compare this functor with the name 'V'. The functor 'ob' is sometimes written '1'. Further functors '2' ("There are exactly 2 . . ."), '3', etc., can also be defined in ontology$_L$.

[52] Cf., e.g., Frege 1879, p. 22, where he explicitly translates the existential quantification of a negative sentence as: "There are some things that do not have the property X".

quantified sentences hover curiously between object-language and meta-language. For example, one is tempted to translate [3] meta-linguistically as: "It is true of some name that if it is substituted for 'X' in the sentential form 'X does not exist', then a true sentence is obtained." But such a meta-linguistic formulation can be expressed explicitly in Leśniewski's system, and does not coincide with the object-language sentence [3].

The possibility of interpreting the particular quantifier in this way has been noted by others[53], but so far as I am aware only Leśniewski has developed it into a strict and consistent system. And no one, it seems, has drawn attention to the curious combination of *meta-linguistic* quantification over a range of (meaningful) signs, with *object-language* sentences speaking about things.

Leśniewski himself apparently never considered any other interpretation of the quantifier. Already in 1914, for example, he used the formulation "For a certain meaning of the expression 'a' ... K is a" (*Przy pewnym znaczeniu wyrazu "a" ... K jest a*) and considered the substitution of 'square circle' for 'a'.[54] He never made any reference to the distinctive features of his interpretation of the quantifiers; on the contrary, in his 'Outline of a new system of the foundations of mathematics' he quoted, without disagreeing, a passage from Tarski where the latter refers to the Mitchell-Peirce interpretation of the quantifiers, which is identical with the Frege-Russell interpretation.[55]

Lejewski calls the russellian interpretation of the quantifiers a restricted one, since it covers only unshared names, and he shows how the russellian formula '$(\exists x)(Px)$' can be translated into the ontological$_L$ formula '$(\exists x)(ex(X) \cdot X \text{ est } P)$'. However, he does not discuss the question how the ontological$_L$ formula '$(\exists X)(X \text{ est } P)$' is to be rendered in russellian language.[56]

Leśniewski's special interpretation applies not only to the particular but also to the universal quantifier. 'For some X' and 'not for all X not' are

[53] Cf., for example, Mates 1950, p. 223.
[54] Leśniewski 1914, p. 64, p. 67, p. 71.
[55] Leśniewski 1929, p. 12. Kotarbiński in his popular introduction stated that '$(\exists X)$ (X *est* A)' means "One can find such a name for 'X', that its denotation (*desygnat*) falls under A", but he does not point out the unusual nature of this interpretation (cf. Kotarbiński 1929 (1961), p. 229).
[56] Lejewski 1954.

equivalent also in Leśniewski's theory. As a matter of fact, he even included only the universal quantifier in the "official" version of his formal system, because the particular quantifier is only one of a whole series of restricting quantifiers (others are, for example: 'for every X which ...', 'for at least nX', 'for at most nX', and so on) and he found it impossible to elaborate a precise rule which would govern the introduction of all of them.[57] An example which is characteristic for Leśniewski's conception of the universal quantifier, is the formula '$(X)(X \text{ est } X)$', which is a *false* ontological$_L$ sentence. It is to be read: "For every X: X is X", the variable 'X' again extending not over a range of objects but over a range of names. A falsifying instance is 'Pegasus *est* Pegasus' or the logically false sentence 'Λ *est* Λ'.

In contrast to the ordinary standard systems of logic[58] in the style of *Principia Mathematica*, Leśniewski's ontology$_L$ holds for all possible worlds of objects. It is a strictly logical system, making no assumptions about the existence of objects, and is trivially valid also for an empty universe. In the system of *Principia* the existence of an object is logically demonstrable via the generally valid theorem

$$(x)(Px) \supset (\exists x)(Px),$$

i.e.: 'If for every x, x has the property P, then there exists some x that has the property P'. With the aid of this theorem it is possible to deduce from a logically true formula like

$$(x)(x = x)$$

the assertion

$$(\exists x)(x = x),$$

i.e.: 'There exists some object x that is identical to itself'.

In ontology$_L$, on the other hand, it is impossible to deduce *a priori* the existence of an object from the corresponding theorems

[1] $\quad (X)(X \text{ est } F) \supset (\exists X)(X \text{ est } F)$

i.e.: 'If for every X: X is F, then for some X: X is F', and

[2] $\quad (X)(f(X)) \supset (\exists X)(f(X))$

[57] Cf. Luschei 1962, p. 117; Sobociński 1960/61, p. 68, footnote 3.
[58] Cf. Church 1958, p. 1013.

i.e.: 'If for every X the function f holds, then for some X the function f holds'. In [1] the antecedent '$(X)(X$ *est* $F)$' is logically false, therefore '$(\exists X)(X$ *est* $F)$' can never be detached. In [2], if a sentence of the form '$(X)(f(X))$' is logically true[59], then it must be the case that the functor has no existential import; but if the functor has no existential import, then '$(\exists X)(f(X))$' similarly has none, since existential import is not a matter of the quantifier '$(\exists X)$' but of the functor.[60]

The sentential calculus of "protothetics", which is presupposed by the name calculus of ontology$_L$, forms a further part of Leśniewski's logic.[61] And here too the quantifiers are interpreted in the same way: sentential variables refer to a value range of sentences, although the quantified sentences in which they occur are sentences of the object-language, and not of the meta-language. It is interesting to note that although Russell appears to have been the first to introduce the quantification of sentential variables[62], subsequently he did not develop the theory further. Perhaps this was due to the fact that here only an interpretation like Leśniewski's is satisfactory.[63]

It is interesting to note that both for Russell and for Leśniewski the problem of existence statements, particularly of negative existence statements, provided the starting-point for philosophical speculation. Their ways of solving this problem were, however, very different.

Russell did not like the fact that in a sentence such as 'Pegasus does not exist', a fictitious name stands in the subject place. As we have seen, he was convinced that every name represents an object in reality, and thus has existential import. He found a way out of this dilemma by means

[59] If '$X = Y$' is defined as 'X *est* Y. Y *est* X', then '$(X)(X = X)$' is logically false. But there are other functions of X, for which '$(X)(f(X))$' is logically true, e.g., '$(X$ *est* $X) \vee \sim (X$ *est* $X)$'.
[60] For a limited theory of quantification where a russellian interpretation of quantifiers is combined with validity for the empty domain, cf. CHURCH 1951, p. 18; HAILPERIN 1953; QUINE 1954; HINTIKKA 1959. See also the papers by K. LAMBERT.
[61] Cf. footnote 28, p. 109.
[62] RUSSELL 1906a; a quantified sentential calculus was taken up again by ŁUKASIEWICZ 1929; cf. also ŁUKASIEWICZ-TARSKI; but Leśniewski's protothetics is the first complete system, which also contains variable sentential functors. It is, up to the present moment, the only worked-out system of this kind.
[63] Cf., below, p. 133.

of the theory of descriptions, which allows a "name" like 'Pegasus' to be regarded as a bundle of predicate expressions – 'horse', 'winged' etc. – all of which stand for universals actually occurring somewhere.[64] Because of the existential import of names, the particular quantifier, too, has existential import, and a special predicate 'exists' becomes unnecessary.

On the other hand, Leśniewski, as we have already mentioned, started from Mill's terminology of denotation and connotation. The difficulty, from his point of view, was that 'existing being' appeared to be a name that connotes nothing.[65] For, assuming further that a sentence is true if and only if the object denoted by its subject-term possesses all the attributes connoted by its predicate-term, he concluded that all existence statements had the same truth value, namely he thought that they were all false.[66] Because of this odd conclusion Leśniewski subsequently left connotation out of account, and developed a logical system, ontology$_L$, based solely on the relation of denotation.[67] He continued, however, to count 'existing being' or 'object' as an admissible expression of his system and thus kept particular quantification and assertion of existence separate.

8.4 Leśniewski's nominalism

The scholastic terms corresponding to (though not synonymous with) 'denotation' and 'connotation' are '*suppositio personalis*' (or '*supposito formalis*') and '*suppositio simplex*'. Although the earlier medieval scholastics bestowed much attention on *suppositio simplex*, later scholastics neglected it. The reasons for this were ontological. Whereas a platonist like Petrus Hispanus regarded a general term in *suppositio simplex* as representing a universal essence, nominalists like Ockham and Albert of Saxony would at most consider it as standing for a mental concept; and Buridan, in all consistency, left *suppositio simplex* entirely out of account.[68]

[64] Cf. p. 44 f., p. 68.
[65] LEŚNIEWSKI 1913, p. 22.
[66] LEŚNIEWSKI 1913, p. 12.
[67] KOTARBIŃSKI 1958, p. 4, draws attention to this change of approach.
[68] Cf. BOEHNER 1952; MOODY 1953, especially p. 33 f., where Moody mentions the difference between the platonistic "inherence theory" and the nominalistic "identity theory" of the copula. (The "inherence theory" is rather a "participation theory", cf. below, p. 163).

As already mentioned, Leśniewski had proved the definition of a general object to be contradictory, and it may well be that nominalistic considerations played some part in his decision to abandon connotation and to restrict himself to the relation of denotation. However, the "bankruptcy" of his pre-logistic period made him even more cautious, and unwilling to enter any "unscientific" metaphysical discussions.

Tadeusz Kotarbiński, on the other hand, not only adopted Leśniewski's logical system, but also wrote a considerable number of essays putting forward the metaphysical standpoint of reism.[69] He summarizes reism in the following three theses: "1. Every object is a thing. 2. No object is a property (*cecha*), a relation, an event or any of the other so-called objects alleged to belong to some ontological category other than that of things. 3. The terms 'property', 'relation', 'event' as well as all other alleged names of alleged objects supposed to belong to an ontological category other than that of things, are pseudo-names."[70]

This is a standpoint of categorial monism, the only category assumed being that of things. Kotarbiński does not reject, however, the subject-predicate sentences of ordinary language: "We assume, of course, that there is snow; that there is white snow; that show is white. It is only the alleged "whiteness of snow" that we refuse to accept."[71] He is thus primarily concerned to avoid naming abstract entities, and for this he relies on Leśniewski's ontology$_L$. He also refers to his viewpoint as '*concretism*', for he assumes no abstract, but only concrete entities. Further designations are 'pansomatism', since for Kotarbiński all things are material bodies, and 'radical realism', because he denies the existence of such things as mental images.[72]

However, the question arises whether it is proper to appeal to Leśniewski's logic in order to support a reistic standpoint. As we have seen, it is true that ontology$_L$ is based on the semantical relation between names and concrete individual objects, and that the particular quantifier only

[69] Kotarbiński first used the designation 'reism' in KOTARBIŃSKI 1929, p. 67. He mentions Leśniewski, Leibniz, and Franz Brentano as precursors of reism (cf. KOTARBIŃSKI 1958a, p. 39, p. 110 f.).
[70] KOTARBIŃSKI 1958a, p. 104–105. For Kotarbiński the designation 'object' is the most general name for "a being (*byt*)", "a something (*coś*)".
[71] KOTARBIŃSKI 1929, p. 65.
[72] KOTARBIŃSKI 1958.

affirms the existence of names, not of objects. An evaluation such as Quine's [73], according to which ontology$_L$ is a class calculus asserting explicitly the existence of abstract entities, overlooks the peculiar nature of a system based on *suppositio personalis* and fails to appreciate the special meaning of its particular quantifier, which is not an existential quantifier in the usual sense.

But although in ontology$_L$ the only primitive semantical categories are the category of names and the category of functors such as the copula '*est*', the theory allows the successive introduction of constants and quantified variables of every possible semantical category, and this makes it comparable with the simple theory of types.

For instance, the functor '*ex*' mentioned above[74], can be introduced by the definition

$$(X)\big(ex(X) \equiv (\exists Y)(Y\ est\ X)\big)$$

i.e.: 'For every X: an X exists if and only if for some Y: Y is X'.

An empirical expression of the same semantical category as '*ex*' would be 'human' as introduced by the following definition on the basis of the *name* 'Human':

$$(X)\big(human\ (X) \equiv X\ est\ Human\big)$$

and this formula might be read: 'For every X : X has the property "*human*" if and only if X is human'. Note, however, that '*human* (X)' seems not to have any new existential import, it is merely viewed as another linguistic way of expressing that X is human. Furthermore, if 'A' is a shared name, then '*human* (A)' is not considered as meaningless, but merely as false.

Once constants of a specific semantical category are introduced into the system, then quantified variables of this semantical category may also be used, since Leśniewski's quantifiers assert only the existence of

[73] QUINE 1952. (Incidentally Quine once stayed in Warsaw and met Leśniewski personally.) Even A. N. Prior, who has been instrumental in promoting the study of Leśniewski's system (cf. PRIOR 1955), writes in one place that ontology$_L$ "is just a broadly russellian theory of classes deprived of any variables of Russell's lowest logical type" and reports approvingly the interpretation of Jerzy Łoś, according to which '*A est B*' expresses simply "the *inclusion* of a unit class in another class" (PRIOR 1965, p. 150, p. 151). However, two pages later Prior has to denounce the term 'class name' as "unfortunate" and speaks instead of "common names".
[74] Cf. pp. 116–117.

expressions. For example since '*human* (*Socrates*)' is true, the following is also true:

$$(\exists f)\,(f(Socrates))$$

which might be read: 'For some f: Socrates has the property f'.

However, the semantical category of names does not represent the ontological category of being an individual object, since it includes also common nouns; similarly the semantical category of the variable 'f' does not represent the ontological category of being a property of individual objects, because the same semantical category includes also functors which together with common nouns as arguments form true sentences. But as we defined a name 'object', so we can try to define a higher level functor 'Property', e.g.[75]:

$$(f)\{Property(f) \equiv (X)(f(X) \supset X \; est \; X)\}$$

This might be read: 'For every f : f is a property if and only if for every X it holds that if $f(X)$, then X is X'. The definition specifies that '*Property* (f)' is a true formula if and only if the argument of 'f' in a true atomic formula is an unshared name.

Instead of applying higher-level functors to lower-level functors we can also explore, in ontology$_L$, the possibilities of predicating functors of the same level of one another by means of a higher-level copula. An example of such a copula is '*est**', defined in the following way[76]:

$$(f)(g)\{f \; est^* \; g \equiv (\exists X)(\exists Y)(X \; est \; Y \cdot f(Y) \cdot g(Y) \cdot \cdot (X)(Y)(f(X) \cdot f(Y) \supset (Z)(Z \; est \; X \equiv Z \; est \; Y))\}$$

i.e.: 'For every f and for every g: f *est** g if and only if (1) for some X and for some Y, X is Y and $f(Y)$ and $g(Y)$, and (2) for any X and for any Y, if $f(X)$ and $f(Y)$, then any Z which is X is also Y and vice versa'. The definition specifies (in the second part of the conjunction of the definiens) that 'f *est** g' is a true formula only if the arguments with which the functor 'f' can form true atomic formulas must all have the same extension. That 'f' must represent exactly one extension corresponds to the requirement that if '*A est B*' is true, then '*A*' must name exactly one object. It can

[75] Cf. SŁUPECKI 1955, p. 56.

[76] Cf. LEJEWSKI 1957, p. 249; see also SŁUPECKI 1955, for further analogues of '*est*'.

be proved that '*est**' is an exact analogue of '*est*', i.e. that if a formula with '*est*' and name variables is logically true, then a corresponding formula with '*est**' and functor variables is true.

Lejewski suggests that, e.g., the English sentence 'Man is a species' has the logical form '*f est* g*'. He believes that in this sentence 'man' and 'species' are only pseudo-names which name nothing and which in a strict logical formulation should be replaced by functors, so that we get: 'Forming-the-class-of-men est* Forming-a-species'. Lejewski does not give definitions of the functors in question, but the first can easily be defined in terms of the name 'Human':

$$(X)\{Forming\text{-}the\text{-}class\text{-}of\text{-}men\,(X) \equiv (Y)(Y \; est \; X \equiv Y \; est \; Human)\}$$

i.e.: 'For every X: The X's form the class of men if and only if any Y that is an X is also human and vice versa'. The definition specifies that in a true atomic formula the argument of the functor must have the same extension as 'Human'.

Although Leśniewski's system allows the successive introduction of constants and quantified variables of ever higher level, this seems not to increase the explicit ontological commitment of its formulas. It seems only to add new ways of speaking. The higher-level symbols are not considered as *naming* anything. The semantical categories of Leśniewski are not said to represent ontological categories but are considered merely as different grammatical "parts of speech".

Higher-order quantification, too, seems not to introduce a new ontological commitment, since the quantifiers range only over symbols. And there seems to be no danger of platonism here, because the symbols can be regarded as concrete tokens: in keeping with the "constructive nominalism"[77] of Leśniewski's system, the rules or "terminological explanations" refer only to sign tokens and stipulate that the deduction or introduction of new sentences can only be based on previous sentences which are effectively available, i.e., which have actually been written down. Although the system and therewith the number of signs may constantly increase, the number of signs at any one moment is always finite.

But if Leśniewski's system makes no explicit reference to abstract

[77] Cf. LUSCHEI 1962, p. 125 f.

entities, this does not mean that reism (i.e., the assumption that there are only concrete things) can give a satisfactory justification of its working. The question, for example, *why* two things are subsumed under the same shared name is left unanswered by reism. As will be shown below, the predication of a general predicate can be justified only by assuming an additional ontological category, distinct from the category of things: one of abstract entities or at least one of concrete properties.[78]

Furthermore, the definitions in Leśniewski's system are more than merely convenient abbreviations which in principle could be dispensed with. Many of them allow us to replace one statement by an equivalent statement which contains symbols belonging to different semantical categories than the symbols in the first. Such definitions cannot be eliminated from the system, because they are "*creative*": through the addition of such a definition to the system sentences can be proved which would not have been provable without it, though these sentences contain neither the defined symbol nor a symbol defined with its aid.[79] To regard such indispensible higher level reasonings merely as calculations with graphical tokens seems not satisfactory. (Leśniewski, who always insisted on the intuitive meaningfulness of every formula of his system, would be the first to admit this.) To do full justice to the formulas of such a proof, it would seem that one must consider them not only as marks, but as marks which express a special *sense*; that like the Stoics one must go beyond reism and accept λεκτά, propositions.

However, it remains true that whereas a russellian type of system commits its user explicitly to the assumption of abstract entities into his universe of discourse, Leśniewski's system makes no such explicit commitment. One might think of clarifying the ontological commitment of Leśniewski's system by translating its sentences into russellian language. But this encounters the difficulty that Leśniewski's distinction between quantification and existential assertion cannot be rendered in russellian symbolism.[80]

[78] Cf. below, p. 178.
[79] Cf. Leśniewski 1931; Słupecki 1953, p. 51; Słupecki 1955, pp. 64–65; Sobociński 1954/55, footnote 13; Luschei 1962 p. 132 f. (Luschei prefers the term 'fruitful' to 'creative'). Concerning creative definitions see also Myhill 1953.
[80] Cf. above, p. 118.

9. W. V. QUINE AND N. GOODMAN

For Quine and Goodman the distinction between names that name something and so-called syncategorematic signs, is of special importance. In order to answer the question "How and what do predicate signs represent?" in their sense, we must first know whether predicate signs are genuine names or merely syncategorematic words. As we shall see, Quine has found a criterion that indicates precisely which words the user of a frege-russellian language regards as genuine names: they are those words in respect of which quantification is permitted; i.e., those that name an object in the value-range of the variables.

We shall find that there are languages whose predicate signs purport to name something, and others with syncategorematic predicate signs. The former are known as platonistic, the latter as nominalistic languages. Mathematicians have long been in the habit of distinguishing between more or less "rich", more or less "platonistic" ontological models. These models may be regarded as value-ranges for the variables of more or less "rich" languages. To nominalistic languages correspond the universes described by Leśniewski's mereology.

As a nominalistic language makes fewer explicit ontological assumptions than a platonistic one, the question as to its adequacy as a language of science will arise. This constitutes a pragmatical criterion for the metaphysical standpoints underlying nominalistic and platonistic languages. Quine and Goodman would prefer a nominalistic language, where predicate expressions are regarded as syncategorematic. However, as we shall see, their account of the syncategorematic functioning of predicate signs is not very satisfactory.

9.1 Quine's criterion

9.11 *To be is to be the value of a variable*

The starting point for Quine is the same as that from which Russell de-