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CHAPTER 2

Semi-Formal Analysis of the Formality-Informality Opposition in the Spirit of the Lvov-Warsaw School

Jacek Jadacki

Abstract

The starting point of this paper is conceptual-terminological specification within the class of transformations performed on language formulas. The following types of transformations are distinguished: enlargement, generalization, extrapolation and variabilization – as well as standardization, schematization and clarification. The term "formalization" is sometimes used as a synonym for "variabilization," "schematization" (that is, its basic sense), or "axiomatization." Each theory is inherently a formal theory (in the basic sense); therefore, the opposition of formal theories to informal theories, and in particular of formal logic to informal logic, has no reason for existence; instead of the formality *vel* informality of some theories, e.g., logic, one should say that one theory, in particular a logical theory, is more (or less) formal than another. The motive for postulating informal logic is the charge of inadequacy against traditional formal logic. In practice, what is practiced under the banner of "informal logic" is sometimes the result of operations that have been called "clarification" here, or such an extension of classical logic that would be a theory of argumentation more adequate than the latter.

Keywords

axiomatization – clarification – classical logic – formalization – Formal Theory – Informal Theory – schematization – theory of argumentation – transformation

1 Introduction: the Need to Clarify the Title Opposition[1]

In 1978, the first issue of the journal *Informal Logic* appeared. Ralph Henry Johnson and John Anthony Blair wrote in their introduction "From the Editors:"

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> Informal logic means many things to many people. Let us then declare our conception of it. For the time being, we shall use this term to denote a wide spectrum of interests and questions, whose only common link may appear to be that they do not readily lend themselves to treatment in the pages of *The Journal of Symbolic Logic*. More positively, we think of informal logic as covering the gamut of theoretical and practical issues that come into focus when one examines closely, from a normative viewpoint, the reasoning that people actually engage in. Subtract from this the exclusively formal issues and what remains is informal logic. Thus our conception is very broad and liberal, and covers everything from theoretical issues (theory of fallacy and argument) to practical ones (such as how best to display the structure of ordinary arguments) to pedagogical questions (how to design critical thinking courses; what sorts of material to use).
>
> JOHNSON & BLAIR 1978: 1

This 'broad and liberal conception' has been characterized by the editors "negatively" and "positively:" negatively – by contrasting the informal logic with formal ("symbolic") one; positively – by indicating what ("the reasoning that people actually engage in") and how ("from a normative viewpoint") the informal logic "covers."

The editors' very imprecise characterization was probably dictated by their desire to attract as many people as possible to their journal, whose "logical" aspirations could not be satisfied by *The Journal of Symbolic Logic*. However, reading texts from later years, included in the field of informal logic – as well as considerations about the informality-formality opposition justifies the analysis of this opposition presented here. This analysis will be "semi-formal." What means "semi-formal" can only be specified at the end of the paper, after making the necessary conceptual distinctions.

2 Operations on Formulas

The language in which one speaks of various transformations made on language formulas is unfortunately far from being precise – and without sufficient precision in this respect, the characteristics of the title opposition will always leave much to be desired. Let's start with the appropriate conceptual-terminological specification. It will not do without neologisms and neosemantisms.

2.1 *Enlargement*

Let's compare the following formulas:

(1) Jack likes Aggie.
(2) A certain boy likes a certain girl.
(3) A certain man likes a certain man.
(4) A certain object likes a certain object.
(5) A certain object remains in relation to a certain object.
(6) There is a certain state of affairs.

We will say about formulas (2)–(6) that they are, in turn, more and more far-reaching enlargement of formula (1). What is the transition from (1) to (2), from (2) to (3) etc.? This transition consists in the fact that these or other members of subsequent formulas are replaced by more and more extensive members in comparison to the first ones (i.e.: "Jack"/"Aggie", "a boy"/"a girl", "a man", "an object").

2.2 *Generalization, Extrapolation and Variabilization*

Enlargement should be distinguished from generalization, extrapolation and variabilization.

Generalization consists in giving a formula containing a certain quantifier such a form, that if this quantifier is a particularizer, it is replaced by a generalizer, and if it is a generalizer with a certain range, it is replaced with a generalizer with a range that extends beyond the output range. For example, the generalization of formula (2) is the formula:

(7) Every boy likes a certain girl.

The generalization of formula (7) is, for example, the formula:

(8) Every man likes a certain man.

In turn, extrapolation consists in giving a formula containing a certain quantifier with a specific range such a form that this quantifier is replaced with a quantifier with a range that is excluded with the range of the output quantifier. For example: the extrapolation of formula (7) is the formula:

(9) Every girl likes a certain girl.

Finally, variabilization consists in replacing a constant term of a certain expression – a variable member (*scil.* a variable) with a range of variability, the subset of which is the denotation of an altered fixed member.[2] For example,

2 An example of the operation of variabilization meant by Kotarbiński is when he speaks of the formula "$x \times (3 + x)$" arising, e.g., from the expression "$2 \times (3 + 2)$" by removing "2's from that expression and filling the blanks with x's" (Kotarbiński 1929/1966, 130). However, I would not agree with Kotarbiński that – contrary to the expression "$2 \times (3 + 2)$," having "a certain meaning" – the formula "$x \times (3 + x)$" "does not mean anything" (*ibidem*). Incidentally, the operation reverse to variabilization is what some call "verbalization."

the result of the variabilization of formulas (1) and (6) are, for example, successively:

(10) *x* likes *y*.

(11) *p*.

2.3 *Standardization*

Consider language L^* such that structural rules defining the construction of expressions of language L^* are indicated. Let us further consider language L such that the structural rules are not indicated for language L or that the structural rules of language L are different from the structural rules of language L^*.

Standardization of utterance U of language L due to language L^* is a reformulation of utterance U in the form of utterance U^* such that:

(i) utterance U^* is a translation of utterance U;

(ii) utterance U^* is built in accordance with the structural rules of language L^*.

Of course, more or less restrictive conditions may be imposed on the translation referred to in (i). And so: each and only such expression, which is synonymous to E, equivalent to E, *etc.*, is considered as a translation of expression E.

2.4 *Schematization*

Schematization of a given statement formulated in a given natural language consists in replacing elements of a defined order of this expression with individual symbols. And so formula (1) would be after schematization:

(11) *Pja*.

Making schematization understood in such a way – must be accompanied by an interpretative preamble, explaining the assignment of individual members of natural language elements to defined symbols. In our example, this preamble would be:

Let:

(i) the symbol '*Pxy*' replaces the expression "*x* likes *y*;"

(ii) the symbol '*j*' replaces the word "Jack:"

(iii) the symbol '*a*' replaces the expression "Aggie."

Sometimes, the schematization of a given formula requires the standardization of this formula – especially when a language whose symbols are to replace expressions of a formalized language has a definite and also a different structure than the formalized language.

Consider, for example, the first of Newton's classical principles of dynamics. In the original version it reads:

(12) *Corpus omne perseverare in statu suo quie scendi vel movendi uniformiter in directum, nisi quatenus a viribus impressis cogitur statumi llummutare.* (Newton 1687a, 20).

In English:

(13) Every body continues in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it (Newton 1687b/1934, 13).

Let's standardize principle (13) in respect to the structure of the language of predicate calculus:

(13*) For each body for which there is no force that would act on this body, then the body remains at rest or moves in a uniformly rectilinear motion.

Let us now accept the following preamble:

b – body;

f – force;

Axy – *x* acts upon *y*;

Mx – *x* moves uniformly rectilinearly;

Rx – *x* remains at rest.

In this case '*b*' and '*f*' are variables with limited scopes, and '*A*', '*M*' and '*R*' are constants.

The effect of schematization of rule (13*) using these symbols – and the specific symbols of the language of predicate calculus – will be the formula:

$$(13^{**})\quad \forall b\,[\sim \exists f\,(Afb) \rightarrow (Mb \vee Rb)].$$

As Ajdukiewicz aptly notes – the function of schematization is to ensure schematized formulas "much more clarity" (Ajdukiewicz 1965b/1974, 98/98).

2.5 *Clarification*

Natural language has certain features that make use of logic tools for its analysis which must be preceded by deprivation (or at least registration) of these features. It includes, among others, ellipticity, amphibolicity, polysemia, occasionality and approximation. Let's name the operation of removing these cognitively undesirable attributes – as well as revealing presuppositions and enthymemes – "language clarification."

Otherwise, clarification is coupled with standardization in such a way that, on the one hand, standardization must sometimes be preceded by clarification, and, on the other hand, clarification can sometimes be achieved more easily by standardization in respect to the language free from the defects mentioned above.[3] In addition, both standardization and clarification must

3 Some aspects of clarification are discussed in the chapter "Semiotic anomalies" of "Spór o granice języka" [Controversy Concerning the Limits of Language]. *Cf.* (Jadacki 2002, 161–187).

ultimately be based on non-algorithmic semantic intuitions. In the choice of such intuitions, we can be guided, at best, by *ad hoc* rules – such as the principle of charity, according to which one should look for such hidden elements of argumentation that ensure its greatest deductive power, or the principle of logical minimum, according to which the given enthymematical argumentation should complement the weakest premise among the premises guaranteeing the conclusiveness of this argument.

3 Theory

3.1 *Deductive Theory*

The deductive theory is a set of sentences such that every sentence belonging to it is an axiom, a theorem or a definition in this theory.

An axiom is a sentence in deductive theory which has no proof in this system; while a theorem is a sentence which has proof in this theory. At the same time: a given sentence has proof in a certain deductive theory, when this sentence was derived from the axioms of this theory by applying the adopted inference rule. The primitive term of the language of a given deductive theory is a term that has no definition in this theory; whereas the derivative term is a term that has such a definition. In turn, a simple term is a term that does not have members that are terms; whereas a complex term is a term that has such members.

The deductive theory is in opposition to the empirical theory, which is a set of sentences for which every sentence belonging to it is an observational thesis, an explanatory hypothesis or a definition.

3.2 *Axiomatized Theory*

Generally, one can say that the axiomatization of deductive theory *T* consists in a clear indication of:

(i) primitive terms of the language of theory *T*;
(ii) derived terms of the language of theory *T* – together with their definitions;
(iii) rules for forming the complex terms of the language of theory *T*;
(iv) axioms of theory *T*;
(v) rules of inference accepted in theory *T*.

In 1928, Łukasiewicz explicitly formulated a program for conferring the philosophy of the form of the axiomatized deductive theory:

> *Scientific philosophy should start its construction* from the *very beginning*, from the *foundations*. To start from the foundations means here to take

in the first place a survey of philosophical problems and to choose from among them only these problems which can be formulated intelligibly, rejecting all the others. Mathematical logic can be already useful in this preliminary work, for it has fixed the meaning of many expressions belonging to philosophy. Then we ought to start trying to solve the philosophical problems which can be intelligibly formulated. The most useful method of realizing such a task seems to be again a method of mathematical logic: the deductive, axiomatic method. We need to base our work on sentences which are as intuitively clear and undoubted as possible; such sentences should be taken as axioms. As primary or undefined notions we need to choose such expressions that their sense can be universally explained by cases.[4] [...] The results obtained in this way should be constantly controlled with the data of intuition and experience and the results of other sciences, especially natural sciences. In the event of non-compliance, the system should be improved by formulating new axioms and selecting new primitive concepts. It is necessary to take care of contact with reality constantly, not to create mythological beings, [...] but to understand the essence and construction of this real world in which we live and act, and which we want to somehow transform into a better and more perfect one.

ŁUKASIEWICZ 1928, 42

3.3 *Formal Theory and Informal Theory*

The term "formalization" is used in three main senses, namely as a synonym of (i) variabilization,[5] (ii) schematization,[6] or (iii) axiomatization.[7] Next, we will only talk about formalization-schematization.

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4 The translation to this place comes from (Jadacki 2017, 114).

5 Among the logicians associated with the Lvov-Warsaw School, Bocheński, among others, puts the matter in such a way; according to him, formal logic is the theory of "logical sentences," i.e., "formulas which exhibit variables in place of words with total meaning; an example is '*B* belongs to all *A*'." In particular, formal logic studies, "the formulas of the prescribed type for which, when they are determined by the constants, the state of affairs must be admitted" (Bocheński 1961, 2–3).

6 Bocheński calls the formalization-schematization the "abstractive method" of creating logic, which consists in the fact that "the logical theorems are gained by abstraction from ordinary language" (Bocheński 1961, 266).

7 It is captured in such a way, among others, by Ajdukiewicz, describing the developmental stages of deductive theories. The last stage, consisting in the axiomatization of the theory, is called by him just "the stage of formalization" (Ajdukiewicz 1965b/1974, 218 *ff*).

For those who, like me, think that there is no theory that does not contain laws, and so general statements, it is clear that the presence of these laws determines that every theory is formalized.

Consider any thesis of (first-order)predicate calculus. Let it be, for example, one of the versions of De Morgan's law:

$$(14) \sim \forall x(Px) \leftrightarrow \exists x \sim (Px).$$

It is said about such a law that it is a formal law, because it concerns only the shapes-forms of symbols that occur in it, and omits the content of these symbols (this content is abstracted). This is, of course, a simplification, because:

(i) The symbols of constants in this calculus have after all a definite content, designated in the case of the functors of negation and equivalence by the axioms of propositional calculus or by logical matrices, and in the case of quantifier symbols by predicate calculus axioms.

(ii) Variables in law (14) are also provided with content by limiting the range of their variability: '*x*' – e.g. to the class of things, and '*P*' – to the class of attributes.

What is the difference between laws (14) and (13**)? The difference is that the domain of theory to which (14) belongs is larger than the domain of theory to which (13**) belongs.

Therefore, opposing formal theories to informal theories, in particular formal logic to informal logic, has no rational basis – and instead of the formality *vel* informality of some theories, e.g., logic, one should say that one theory, in particular a logical theory, is more (or less) formal than another.

I cannot give the general characteristics of a more-formal-than relationship. I will limit myself to the following illustration only.

Well, law (14) is more formal than rule (13**), because the ranges of variability of variables from (14) are supersets of the ranges of variability of the respective variables from (13**). In particular, the range of the variable '*x*' – is a set of all objects (of a certain universe); while the ranges of variables '*b*' and '*f*' – are sets of bodies and forces respectively (and thus only of certain objects, while the range of variable '*P*' is a set of all properties, while the ranges of variables '*M*' and '*R*' are only certain definite («active») properties. However, the image is darkened by the presence of variable '*A*', whose scope is the specified two-argument relationship; there is no generalized equivalent for this relation in (14) in the form of a variable whose range would be any two-argument relation.

It is worth noting that there is no formula that would be fully formal. Certainly, law (14) is not such a formula. The impression that it is quite different comes from the fact that in the calculus of predicates, to which law (14) belongs, the content elements (ranges of appropriate variables and interpretations of constants) are specified in the preamble excluded outside tautologies in the form of a meta-language description.

4 Adequacy of Theory

Consider set of objects *S* and theory *T*. If every object belonging to set *S* satisfies every thesis of theory *T*, then:
(i) set *S* is a model of theory *T*;
(ii) theory *T* is adequate to set *S*.[8]
This is the case, for example, when S^* is the set of states of affairs, and T^* is classical propositional calculus. Suppose, however, that set S^{**} is a set of things. Well, set S^{**} is not a model of theory T^*, and theory T^* is not adequate to set S^{**}. For in theory T^*, the only variables are propositional variables, and the denotations of sentences (*scil.* the elements of set S^{**}) are just only states of things – not things.

When a set of objects, in relation to which a certain theory is adequate, is a real field, then the theory, as Ajdukiewicz puts it, "fulfills an extremely important though only service role in the scientific cognition of reality:"

> For if a researcher who is studying real facts succeeds in finding out that the fact he is concerned with satisfies the axioms of a given abstract deductive theory (i.e., if the sphere of those facts is a model of that theory), then owing to the work done earlier by the scientist who studied that abstract theory by deducing derived theorems from axioms, the student of facts can learn, without any extra effort on his part, that the domain he is concerned with also satisfies the derived theorems of that theory; he thus significantly broadens his knowledge of the sphere of facts he is studying.
> AJDUKIEWICZ 1965b/1974, 206

8 Theses (i) and (ii) are basically equivalent, but thesis (i) better suits the procedure in which we search for a model for the constructed theory, and thesis (ii) – for the procedure in which we construct a theory for the previously specified set of objects. Bocheński links the first procedure with "mathematical logic (logistic, symbolic logic etc.). [...] Mathematical logicians proceed in [...] [such a] way: first construct purely formal systems, and later look for an interpretation in every-day speech" (Bocheński 1961, 266). Bocheński, very rightly, emphasizes that "this process is not indeed always quite purely applied; and it would not be impossible to find something corresponding to it elsewhere. But at least since Boole, the principle of such construction is consciously and openly laid down, and holds sway throughout the realm of mathematical logic" (*ibidem*).

The elements of set *S*, which theory *T* deals with, and the relations between these elements must obviously be identified by a certain language – let's say: *L*. If language *L* is different from the language of theory *T*, then to assess the adequacy of theory *T*, we need that the statements about set *S* formulated in language *L* be standardized in respect to the language of theory *T*.

Sometimes, the adequacy assessment may be wrong just due to incorrect (unsuccessful) standardization. Sometimes, however, the reasons may be deeper.

4.1 *Inadequacy of Classical Logic*

Critics of classical logic generally identify classical logic with (assertive) syllogistic logic, propositional calculus, and predicate calculus (usually first-order one), and this logic is considered an inadequate in respect to argumentative operations (in particular: reasoning). It can be briefly said that they deny the adequacy of this logic as the theory of argumentation.[9] They think, namely, that:

(i) arguments in natural language are rarely fully standardized in respect to the language of classical logic;

(ii) this logic applies only to declarative sentences (i.e. so-called sentences in the logical sense), while non-declarative sentences are also members of real argumentation;

(iii) this logic is not suitable as a tool to assess the correctness of real argumentation ("real life [everyday] arguing" (Groarke 2017)), because it can only be used to examine whether the members of this argumentation remain one to another in relation to the logical consequence; meanwhile, in real argumentation, it is often about other things.

Well – it is true that the inadequacy ascribed to classical logic actually takes place. However, classical logic does not simply have the aspirations referred to in (i)-(iii). This should be by no means equated with the fact that classical logic is at most a theory of some "concocted arguments." Many representatives of the Lvov-Warsaw School believed that the axiomatization of a theory is a means not to eliminate semantic intuitions, but to "give precision" to them (Ajdukiewicz 1965b/1974, 215).

The usual way of dealing with a certain inadequacy is to construct a theory that removes this inadequacy.

9 It must be admitted that some formulations of the logicians themselves give rise to such criticism. Kotarbiński, for example, writes about the formal logic as the science of forms of reasoning (Kotarbiński 1929/1966, 129), which could suggest that it concerns ALL forms of reasoning.

A good example of this is the criticism directed by Ajdukiewicz towards the reconstruction of concepts associated with the terms: "inference," "proof," "verification," "explanation," "deduction," "reduction" and "reasoning" made by Łukasiewicz (and modified by Czeżowski). Ajdukiewicz considered these reconstructions to be inadequate in respect to the concepts as commonly referred to. Therefore, the conceptions of Łukasiewicz and Czeżowski would deprive us of certain concepts "needed" in methodology.

Ajdukiewicz suggested that they should be suitably modified, and in particular "extended in [their] concept of reasoning so that it would cover solving all kinds of problems, and even more broadly: all kinds of mental tasks, if we solve them using inference or even just drawing sentences from others" (Ajdukiewicz 1955, 220–221), wherein one infers a certain sentence from an accepted sentence, and one draws it from a "conceivable," assumed sentence.

4.2 *Postulate for Adequate Logic*

The problem of the adequacy of classical logic – and in general: of logic – was posed in the Lvov-Warsaw School by its founder in the work "Logical Symbolism and Thinking" unpublished up to now (Twardowski 1917). Twardowski put in this work a thesis that both traditional logic (syllogistics) and its modernized nineteenth-century versions are not adequate theories of argumentation.

It avoids here the logical formalism, wanting to capture immeasurable wealth and immense diversity of forms of thinking into several formulas. Thus, these theories cannot only be regarded as an exhaustive picture of reasoning, but also, in practice, expose us to numerous difficulties.

And indeed: Does anyone really resort to these forms to show the inaccuracy of reasoning? Probably only philosophers, when they want to show an illogicality to their opponents.

Twardowski gave three conditions that a logical system should fulfill to be an adequate theory:

A) [An adequate system] should not prejudge what categories of judgments are or force all judgments to take only certain definite forms. Each judgment must be part of the reasoning as closely as possible, but at the same time it can be expressed in the closest accordance with the spirit of the appropriate language. Language buffs make it difficult to investigate reasoning.

B) [An adequate system] must be free from rules and regulations, whose learning and application requires a separate skill. [...]

C) [An adequate system] must correspond to the essence of reasoning, and not substitute for it any other operations that are at best only a certain isolated form of reasoning.

The following system fulfills these criteria:

Reasoning is to see what judgments result from others. [...] At the bottom of [...] reasoning, there is [...] the conviction [...] that:

If [the reason] is true, then [the consequence] must be also true.

This general principle of reasoning breaks down in practice into thousands of concrete forms.

Twardowski formulated two exemplary detailed rules:

If it is true that object *A* never has certain property *P*, then it must also be true that objects *B* which have this property *P* are not objects *A*.

If [it is] true that objects *A* have property *P*, and objects *B* do not have property *C*, then it must also be true that objects *B* are not objects *A*.

Twardowski's conclusion was:

> The theory of logic is to search for all these properties in a possible assembly and group them. But before this happens, we can check the correctness of reasoning. Namely, [we can] always be aware of what principles [lie at the basis of this reasoning].

4.3 *Non-Classical Logic*

The answer to the observation that the conjunction "or" of natural language does not usually behave as an ordinary alternative of propositional calculus ('∨'), was to enrich the repertoire of the conjunctions of this account with the disjoint alternative "either-or." The answer to the observation that it is impossible to standardize the utterances of natural language containing the conjunction "and" with the aid of the conjunction of propositional calculus ('∧') because, at least in some contexts, this conjunction is an abbreviation of the temporal conjunction "and then", is to construct a system enriched with an appropriate temporal operator. The fact that the "if-then" conjunction is used in natural language is not only to exclude the situation in which the predecessor's event is accompanied by a successor, but also to express the fact that the user of this conjunction does not know whether the predecessor is real or not – this gave impetus to research on the expressive function of utterances.

The inadequacy of assertive syllogistics consisted, on the one hand, in the failure to account for relations, and on the other – alethic modalities; the remedy was the logic of predicates (with predicates of any number of arguments) and different versions of modal logic – starting from modal syllogistics.

The genesis of Łukasiewicz's multivalued logic and Leśniewski's mereology was similar. The first was brought to life to meet indeterministic intuitions, according to which, for some sentences about the future, the principle of excluded middle does not apply. In turn, the second was to capture the specific properties of the natural language conjunction "is an element of" (*resp.* "is part of"), which does not belong to the conjunction "is part of" of standard set theory.

4.4 *So-Called Informal Logic*

In connection with the alleged inadequacy of classical formal logic, it is postulated that an adequate theory of argumentation be constructed, which – very unfortunately – is called "informal logic."[10]

This is an unfortunate term for two reasons.

First, classical logic – although it is generally a formalized theory (in the above-mentioned sense) – can also be formulated in non-formal language. Secondly, the theory of argumentation – taking into account the areas postulated by critics of the adequacy of the classical logic – can also be both formal and informal (and also – otherwise – axiomatized or not).

In practice, what is practiced under the banner of "informal logic" is sometimes the result of operations that have been called "clarification" here, or such an extension of classical logic that would be more adequate theory of argumentation than the latter, i.e.:

(i) argumentations whose elements are not only declaratives (sentences in the logical sense), but also, for example, interrogatives and imperatives;
(ii) argumentations in which it is not about a deductive force of premises, i.e., a degree of justification that they give the conclusion in terms of logical value (truth or probability) or assertive value (certainty or admissibility), but about their persuasive force, i.e., about to what extent they contribute to the change of the convictions of the addressee's argumentation, which is desired by the person using this argumentation.

5 Conclusion: Semi-Formal Analysis

As announced, in the conclusion I will present my explanation of the neologism "semi-formal."

10 It is worth noting that people practicing this so-called informal logic admit their affinity with Ajdukiewicz's idea of pragmatic logic. For example, we read in (Groarke 2017): "Outside of the English speaking world, the goals of informal logic have been pursued in the Polish tradition of "pragmatic logic," which promotes the tools of logic as a component of general education which can ensure that students think more clearly and consistently; express their thoughts and ideas systematically and precisely; and justify their claims with proper inferences."

Well, I consider "semi-formal analysis" an analysis, the effects of which are grasped in formal formulas, such that the content of their interpretative preambles are incorporated into these formulas themselves. For formula (14), such a semi-formal counterpart would read, for example, as follows:

(15) It is not true that for each individual x we have that property P belongs to individual x – always and only when – for an individual x we have that it is not true that property P belongs to individual x.

Many representatives of the Lvov-Warsaw School used just such semi-formal formulations in their analyses.

A formal analysis – or rather (in the spirit of § 3.3) more formal than my analysis presented here – of the title opposition is waiting for its creator.

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