



ANNA PIETRYGA

Semantically Closed Languages Reconsidered. Re-Reading Alfred Tarski

ABSTRACT: The text shows that Alfred Tarski studied semantics to define a true sentence in a materially adequate and formally correct way, and in effect he defined the co-called semantically closed languages as a subset of formalized ones, in which the occurrence of the Liar paradox is imminent because of the features of the language used. This is one of the points of Tarski's heritage where misunderstandings constantly occur among the readers of Tarski's work, and that is why the present paper may prove to be useful by presenting suitable excerpts from the original Tarski's text. Tarski found additional limiting criteria applicable to formalised languages, which may prevent the appearance of the Liar paradox hidden inside the paradox itself. They deal with self-referring expressions which occur in natural languages even more frequently than the sentence „John loves Mary”, which is only sometimes true.

KEY WORDS: truth • semantics • paradox • self-referential • materially adequate • formally correct

Introduction

Alfred Tarski chose to study the discipline of semantics, which has usually lead (and still leads) people to antinomies (e.g. via the Liar paradox). This logician was trying to make semantics a scientific discipline. One of the notions Alfred Tarski invented for semantics was that of semantically closed languages (henceforth SCL). The notion is just a small part of Tarski's great work, the work which is being widely discussed. The point I want to present is that the notion of semantically closed languages may be understood differently than in the way commonly accepted all over the world. In my opinion the state of art in world's literature concerning that very notion is inappropriate as to what Tarski actually did write on the subject. A part of the problem is that there are few people who actually do read Tarski's works and understand them. Unfortunately, this is also true about Tarski's home country, where he is often admired, but at the same time not properly read. I want to contribute to a change in this situation by publishing this paper.

What led Tarski to discovering semantically closed languages?

Tarski introduced the notion of semantically closed languages as late as in 1944, and presented the last particulars on that point only in 1969, though he was working on languages in general since early 1930s¹. Tarski was studying languages in order to define a true sentence in a materially adequate and formally correct way². Tarski started his investigation, because he had found that the classical definition was far from precise. He formulated it in everyday language as: “a true sentence is one which says that the state of affairs is so and so, and the state of affairs indeed is so and so”³. Only in his “Semantic conception of Truth” did Tarski actually quote Aristotle: “To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, or of what is not that it is not, is true”⁴.

Tarski wanted to grasp the intuitions contained in the so-called *classical* conception of truth (“true-corresponding to reality”) in contrast, for example, to the utilitarian conception (“true – in a certain respect useful”)⁵. At that time, he was considering all types of languages, and first presented his results considering natural language as opposed to formalized ones. Natural languages are languages like Polish or English. Tarski immediately gives up the attempt to construct the definition for natural languages. The reasons he gives are as follows:

¹ Cf. A. Tarski, *O pojęciu prawdy w odniesieniu do sformalizowanych nauk dedukcyjnych*, Lvov–Warszawa 1930/1931, [in:] A. Tarski. *Pisma logiczno-filozoficzne*, ed. by J. Zygmunt, vol. 1. *Prawda*, Warszawa, 1995, pp. 3–8, A. Tarski 1933, *Pojęcie prawdy w językach nauk dedukcyjnych* (1932), [in:] *ibidem*, p. 9–12, A. Tarski, *Pojęcie prawdy w językach nauk dedukcyjnych* (1933), [in:] *ibidem*, p. 13–172, *Der Wahrheitsbegriff in den Sprachen der deduktiven Disciplinen*, “Der Akademie der Wissenschaften in Wien, Mathematisch-naturwissenschaftlichen Klasse, Akademischer Anzeiger”, vol. 69 (1932), p. 261–405).

² A. Tarski, *The Semantic Conception of Truth and the Foundations of Semantics*, “Philosophy and Phenomenological Research”, vol. 4, no 3, p. 341, cf. A. Tarski 1932, A. Tarski (1935) *The Concept...*, p. 152.

³ A. Tarski, *The Concept...*, p. 155. In his another paper in Polish (A. Tarski, *O Ugruntowaniu Naukowej Semantyki*, p. 401) when Tarski writes about Aristotle, he refers the reader to a book by T. Kotarbiński, *Elementy teorii poznania, logiki formalnej i metodologii nauk*, Lvov, 1929, p. 125 ff., (the book was translated into English only in 1966 and the Tarski’s text quoted does not contain the reference, cf. Polish version of *The Establishment...*, p. 233). The full text of the classical definition by the ancient author is to be found in Aristotle, *Metaphysics* IV, VII, 1, 1011b, p. 25, see https://www.loebclassics.com/view/aristotle-metaphysics/1933/pb_LCL271.201.xml [26.12.2019].

⁴ A. Tarski, *Semantic Conception...*, p. 343.

⁵ *Idem*, *The Concept...*, p. 153, cf. *ibidem*, p. 163ff.

The results will be entirely negative. With respect to this language not only does the definition of truth seem to be impossible, but even the consistent use of the concept in conformity with the laws of logic⁶.

Even without reading Tarski's work one can admit that people understand the truth in a number of idiosyncratic ways, which leads to various misunderstandings and quarrels, both in politics and in doing shopping. Some people write books about misunderstandings between men and women and some write papers or books about some (conflicting) views on the relation between logic and natural language⁷.

The reason why I suppose this paper may prove to be useful

Nowadays innumerable commentators write books and essays about Tarski's work, and also many of them quote some of the most famous passages he wrote. Sometimes this happens even to the authors who defend mutually opposite views on our present topic that they quote the same passage. This has happened to me in my polemics with Graham Priest⁸, who, when answering my criticism, used as one of the arguments the same passage I had used as one of mine (see below in paragraph 7). Another case I experienced myself was that an anonymous reviewer criticised my view, expressed in Pietryga's *Tarski's T-scheme as an Alleged Basis of Montague Semantics*⁹, by stating that "[t]he T-convention [which will be presented later in this paper] was meant [by Tarski-A.P.] for formal languages only, as Tarski could not give a satisfactory [here the word structural has been missed – A.P.] definition of a sentence in natural language". He also claimed that my [A.P.'s] opinion is not in agreement with the "common understanding of Tarski"¹⁰.

⁶ *Ibidem*, p. 153. The same author reached the negative results presented as soon as in his 1931 and 1932 works, cf. J. Zygmunt, *Alfred Tarski – a biographical sketch*, [in:] A. Tarski, *The philosophico...*, p. 4 and 10.

⁷ J. Pogonowski, *Dialog czy sprzeczka? O metodach formalnych w lingwistyce*, [in:] S. Gajda, Ed., *Dyskurs naukowy – tradycja i zmiana*, Opole 1999, 97–101, *passim*, B. Stanosz, *Logika języka naturalnego*, Warszawa 1999, A. Pietryga, *Status Zasady Sprzeczności w świetle logiki współczesnej*, 2004, pp. 49–56.

⁸ Cf. A. Pietryga, *Graham Priest and his T-scheme*, "Polish Journal of Philosophy", 2013, vol. VII, no 2, pp. 37–51, p. 41 and G. Priest, (*Replies*) 2. *Pietryga*, "Polish Journal of Philosophy", 2013, vol. VII, no 2, pp. 96–100. 2013, p. 99.

⁹ *Idem*, *Tarski's T-scheme as an Alleged Basis of Montague Semantics*, "Logic and Logical Philosophy", 2007, vol. 15, no. 4, pp. 369–379, <http://apcz.umk.pl/czasopisma/index.php/LLP/article/view/LLP.2006.021/149>, 26.12.2019, p. 373.

¹⁰ Both quotes in this sentence were originally written in Polish and signed by my reviewer 2 in my osf.opi.org.pl grant attempt in 2013, ID 222882, registration no: 2013/09/B/HS1/00338.

The same reviewer challenged my opinion that Tarski “states explicitly that natural languages, like Polish or English, are NOT semantically closed”¹¹, as “Tarski has not said this anywhere – to the contrary, he wrote (being influenced by [Stanisław – A.P.] Leśniewski) that it is a characteristic feature of the natural language that it is universal (1933)”¹². I fully agree with the statement that Tarski considered natural language as a universal one, though the negative existential thesis of the reviewer is rather surprising.

Next, the reviewer listed the authorities whose work and its greatness support his opinion. My reviewer’s sources were P. Raatikainen and J. Woleński. The former wrote about Tarski and semantically closed languages in the following lines (which were indicated by my reviewer):

For Tarski, the main problem with colloquial languages was that they are semantically closed [in the footnote we read: Or, more accurately, that they purport to be semantically closed (see Patterson 2006).], for it is this aspect of them that leads to antinomies. However, suitable (semantically open) fragments of natural language, with sufficiently specified grammar, were wholly acceptable for him as object languages for truth definitions. Tarski had only complaints against natural language taken in its entirety (cf. Woleński 1993)¹³.

My reviewer did not mention the footnote in the first sentence of his quote above, though it is obviously important for the subject he undertakes. What does my reviewer’s other source say on the subject? Woleński, writing about “Tarski as a philosopher” states that:

Tarski blamed ordinary language for its closeness, vagueness and impreciseness. Especially, closeness is a fatal property of ordinary language, because it is responsible for semantic antinomies. However, it is quite possible to construct an artificial formalized language which is semantically closed, i.e. contains its own metalanguage. It appears that when Tarski blames ordinary language, he has in mind natural languages in their entirety, that is universal (=closed) linguistic systems¹⁴.

¹¹ A. Pietryga, *Two Kinds of Unexpected Problems in Writings on Logic*, “Logic and Logical Philosophy”, 2006, vol. 15, no 2, pp. 155–162, <https://apcz.umk.pl/czasopisma/index.php/LLP/article/view/LLP.2006.009/1486>, 26.12.20019, p. 159.

¹² A. Tarski, *The Concept...*, p. 164.

¹³ P. Raatikainen, *Truth, Meaning, and Translation*, [in:] *New Essays on Tarski and Philosophy*, ed. D. Patterson, Oxford, New York, 2008, 247–262, p. 258, the J. Woleński’s work mentioned is the following one: J. Woleński, *Tarski as a Philosopher*, [in:] *Polish Scientific Philosophy: the Lvov-Warsaw School*, “Poznań Studies in the Philosophy and the Humanities”, 1993, vol. 28, pp. 319–338.

¹⁴ J. Woleński, *Tarski as a Philosopher*, p. 329.

Answering my reviewer I may only notice that *universal* does not equal *closed*, just as much as *closed* does not equal *semantically closed*. Woleński's text does not seem precise enough in this respect. He continues in a similar manner:

On the other hand, we are always able to take a part of any ordinary language and try to transform it into a language with a specified structure. Tarski may of course be wrong in his view on languages with a specified structure, but his remarks on ordinary language, in spite of their ambiguities, by no means support the conclusions that Tarski-style semantic is limited exclusively to artificial formalized languages¹⁵.

Still, we all at times miss the point. That is why my intention is to read Tarski again and confront my views with other scholars, so that some agreement in regard to the more problematic parts of his theory could be ultimately reached.

The other quote from Woleński's writings, which concerns my present topic, I have noticed myself, without the reviewer's help, while learning epistemology from a book by the philosopher. The author, in his great and comprehensive academic *Epistemologia* ("Epistemology"), quotes a lengthy passage from Tarski's *The Concept*, of which I will present a short part:

[i]n my opinion the considerations of §1 [of *The Concept*] prove emphatically that the concept of truth (as well as other semantical concepts), when applied to colloquial language in conjunction with the normal laws of logic, leads inevitably to confusion and contradictions¹⁶.

Next, Woleński writes that we can see from the quote that Tarski did consider semantic analysis *applicable* to these languages, since for him it proves the contradictoriness of this language¹⁷. It seems to me that the author, in a way, does not quite get the point Tarski is making in the passage. The text is a warning. Its author says like a parent: yes, you can apply logic to natural language, but you should not. You would risk contradictions and confusion. The Reader is invited to read all paragraphs of *The Concept* and develop his or her own opinion on the subject of semantically closed languages. The text is demanding and, as Kotarbiński wrote in his review of *The Concept...* in 1934: "The willing and also competent consumers it may find will be few and far

¹⁵ *Ibidem*.

¹⁶ J. Woleński, *Epistemologia*, p. 286., English text taken from Tarski, *The Concept...*, p. 267, cf. A. Tarski 1933, p. 158.

¹⁷ J. Woleński, *Epistemologia, op. cit.*, pp. 286–287, cf. A. Tarski, *The Concept...*, p. 267.

between” (Translation mine, A.P.)¹⁸. However, the book is worth every minute of your time, if you belong to the willing and the competent.

What are formalized languages and are all of them semantically closed?

The other group of languages Tarski considers are formalized languages. They are very special languages one does not normally use to talk, but which are useful for mathematics (you write prices in this language, as well as operations like addition or multiplication with their results). Mathematicians, physicists and computer programmers use them much more frequently and in more advanced ways than average persons and, as will be noted later in this paragraph and in paragraph 7, it surprisingly does have something to do with proving true sentences, which is not always possible, even when the top specialists do their best.

Tarski does not define formalized languages exactly in his *Concept of Truth...*, but explains what they are in the following words:

These can be roughly characterized and artificially constructed languages in which the sense of every expression is unambiguously determined by its form. [...] (α) for each of these languages a list or description is given in structural terms of all the signs with which the expressions of the language are formed; (β) among all possible expressions which can be formed with these signs, those called sentences are distinguished by means of purely structural properties¹⁹.

The logician develops the thought in *Truth and Proof*, writing that it is unacceptable for an expression of a formalised language to be regarded as a sentence at some place and not be considered one at another place, or for an expression to be considered a true sentence at one place and false at another one²⁰.

In the same work, formalized languages were briefly characterized by Tarski as a part of an axiomatic theory: “An axiomatic theory, whose language has been formalized and for which the notion of a formal proof has

¹⁸ T. Kotarbiński, *W sprawie pojęcia prawdy, Tarski Alfred: Pojęcie prawdy w językach nauk dedukcyjnych*, “Przegląd Filozoficzny” 1934, year-book 37, i. 1, pp. 85–91, <http://www.wbc.poznan.pl/dlibra/plain-content?id=120568>, 23.12.2019, 1934, p. 88.

¹⁹ A. Tarski, *The Concept...*, pp. 165–166.

²⁰ *Idem*, *Truth and Proof*, [in:] *Scientific American*, 1969, vol. 220, no 6, 63–70, 75–77, <https://cs.nyu.edu/mishra/COURSES/13.LOGIC/Tarski.pdf>, 23.12.2019, p. 68.

been supplied is called a formalized theory”²¹. Tarski found that the general truth definition he was seeking cannot be applied to every formalized language – he had already written about it in his *Concept of Truth* (paragraph 7) and later in *Truth and Proof*²². Showing the reason for his opinion, in *Truth and Proof* he insists on differentiating between the object-language (the one that is spoken about) and the metalanguage (in which one speaks about the object-language). The metalanguage has to be rich enough to serve as one with regard to the object-language, which it should contain as its part²³.

Tarski studied several types of formal languages and noticed that some of them will cause problems when one tries to formulate a general definition of a true sentence for any of them. He introduced Convention T²⁴ for a generalized truth scheme (*Tr* is the name for the class of true sentences, *S* – the class of meaningful expressions):

Convention T: A formally correct definition of the symbol ‘*Tr*’, formulated in the metalanguage, will be called an adequate definition of truth if it has the following consequences (*Tr* stands for the set of true sentences, *S* for sensible expressions):

(α) all the sentences which are obtained from the expression ‘ $x \in Tr$ ’ if and only if ‘*p*’ by substituting for the symbol ‘*x*’ a structural-descriptive name of any sentence of the language in question and for the symbol ‘*p*’ the expression which forms the translation of this sentence into the metalanguage;

(β) the sentence ‘for any *x*, if $x \in Tr$ then $x \in S$ ’ (in other words ‘ $Tr \subseteq S$ ’)²⁵.

In his later paper, in which the logician shows the relation between truth and proof, Tarski found that the infinite number of conjunction elements is an obstacle for a general truth definition in the case of languages which contain variables of arbitrarily high order (i.e. languages of infinite order, like that of the general theory of classes)²⁶. It is so, he notices, because metalanguage has to be essentially richer than the language which is being spoken of in it, and it cannot be the same nor can it be possibly translated into the object-language, as in this way each of them would be universal and the Liar paradox would appear in both of them. Anyway,

²¹ *Ibidem*, p. 68.

²² Cf. e.g. *idem*, *The Concept...*, p. 220, A. Tarski, *Truth and Proof*, *op. cit.*

²³ *Idem*, *Truth and Proof*, *op. cit.*

²⁴ *Idem*, *The Concept...*, pp. 187–188, symbols *Tr* and *S* were introduced *ibidem*, p. 187, and also earlier *ibidem*, p. 178.

²⁵ *Ibidem*, p. 187–188.

²⁶ Cf. *ibidem*, p. 220 and 241.

the general definition of a true sentence is impossible to formulate, as such a definition would have to have been an endless conjunction of partial definitions, and a formula is a finite sequence of signs²⁷.

Besides, in the 1956a text Tarski shows that some true sentences are not provable²⁸. The author also presented some more details, in particular those referring to the Kurt Gödel's incompleteness theorem, and an interested reader will find some of them in paragraph 7 below.

The author knew his work would be difficult to read for persons not used to the deductive system languages, as some "purely mathematical concepts and methods"²⁹ are needed for constructing the definition of truth, and he hoped that his work will "convince the reader that these methods are already the necessary tools, even for the investigation of purely philosophical problems"³⁰.

Some clue must be hidden inside the Liar paradox. SCL defined

Let us come back to the problem of definition. After many mistaken attempts to redefine the truthfulness of a sentence, Tarski found it important, already in *The Concept*³¹, for the task of constructing the definition of a true sentence, to analyze what happens in the classical liar paradox³², in which somebody says „I always lie”. If he/she tells the truth, what he/she says is false. Thus, he/she is not a liar. *Quod erat demonstrandum*. We have obtained a paradox.

The logician tried to reformulate the classical definition as "it is snowing^c is a true sentence if and only if it is snowing"³³ a sentence which became widely known as his T-scheme. He indicates simple methods of its formalization and generalization, and immediately rejects all of them as failures. He tried to use several ways of introducing the sentence names, treating them as:

- a simple object which may not change (like an inscription)³⁴;
- a complex object whose parts may be named, down to the letters it is composed of, and its internal order of their sequence³⁵;
- by indicating its position on a particular page³⁶.

²⁷ Cf. *idem*, *Truth and Proof*, p. 68–69.

²⁸ *Idem*, *The Concept...*, p. 198.

²⁹ *Ibidem*.

³⁰ *Ibidem*, p. 154–160.

³¹ *Ibidem*, p. 155–160.

³² It may also be called a semantic antinomy.

³³ A. Tarski, *The Concept...*, p. 156; *idem*, *The Establishment...*, p. 404; *idem*, *Semantic Conception...*, p. 343.

³⁴ *Idem*, *The Concept...*, p. 157; cf. J. Pogonowski II. *Pojęcie prawdy w językach nauk dedukcyjnych* (1933), <http://logic.amu.edu.pl/images/b/b5/P2t.pdf>, 23.12.2019, 2011, p. 4.

³⁵ A. Tarski, *The Concept...*, p. 157.

³⁶ *Ibidem*, p. 156–157; *idem*, *Semantic Conception...*, p. 347.

None of the methods provided an amendment for the classical definition which would be both expressing its nature and be general.

In Tarski's *Semantic Conception* we read about the reasons of his taking interest in the *Liar*:

In order to discover some of the more specific conditions which must be satisfied by languages in which (or for which) the definition of truth is to be given, it will be advisable to begin with a discussion of that antinomy which directly involves the notion of truth, namely, the antinomy of the liar³⁷.

For transparent presentation of this paradox and related problems Tarski used the inverted commas formulation, taken from Jan Łukasiewicz³⁸. In this formulation a typographical convention is used, allowing *c* to be the name of a particular sentence, and for this particular sentence to be one having the following form „*c* is not a true sentence”. The paradoxical sentence, which is not hard to obtain after the above-mentioned convention has been introduced, is the following one: „*c* is a true sentence if and only if *c* is not a true sentence”.

We obtain the paradoxical sentence by building the following two sentences and remembering the convention mentioned:

1. „*c* is not a true sentence” is a true sentence if and only if *c* is not a true sentence;
2. „*c* is not a true sentence” is identical with *c*.

Substituting for 1), according to 2), *c* for „*c* is not a true sentence”, we obtain the internally inconsistent sentence: „*c* is a true sentence if and only if *c* is not a true sentence”.

Besides the main problem of paradox appearance there are others, caused by the presented solution itself. One of them is that *c* is being used in everyday language, and you would rather not replace it every time it appears (e.g. in the word *C o n n e c t i c u t*), if our intention is to obtain the precise definition of what it means for a sentence to be true.

This method proved to be quite inadequate for the task undertaken or, in Tarski's own words, the sentences produced „are not formulations of the thought we wish to express, and they are, in fact, obviously senseless”³⁹.

After seeking the reasons for paradox appearance, Tarski summed up his findings as follows:

³⁷ *Idem, Semantic Conception...*, p. 347.

³⁸ *Idem, The Concept...*, p. 157.

³⁹ *Ibidem*, p. 160.

If we now analyze the assumptions which lead to the antinomy of the liar, we notice the following:

(I) We have implicitly assumed that the language in which the antinomy is constructed contains, in addition to its expressions, also names of these expressions, as well as semantic terms, such as the term 'true', referring to the sentences of this language; we have also assumed that all sentences which determine the adequate usage of this term can be asserted in the language. A language with these properties will be called 'semantically closed'.

(II) We have assumed that in this language the ordinary laws of logic hold⁴⁰.

Tarski notices that every language which satisfies both of these two assumptions is inconsistent so, choosing between the two assumptions, his decision is to declare never to use semantically closed languages⁴¹.

Let us list the conditions defining what a semantically closed language as defined by Tarski is. The term denotes the languages each of which contains everyone of the following:

- its own expressions
- the names of its expressions
- terms referring to meaning (i.e. semantic terms), e.g. the term T R U E, referring to the sentences of the language in question
- conditions of proper usage of semantic terms when applied to its expressions, formulated in the very language in question⁴².

However, the introduction of limitations does not tame the L i a r paradox. It keeps appearing unexpectedly, even though the language used is a formalized one, and the safety measures listed above have been taken. Seeing this, the logician realized the problem was somehow linked to the use of the „true sentence” phrase in the convention. Still, in *The Concept* the author did not realize the details of the problem, stating: „[n]evertheless no rational ground can be given [emphasis – A.P.] why such substitutions should be forbidden in principle”⁴³.

Rational ground emerges: self-referential expressions

Eleven years later, it turned out that the paradox hinges on some deep assumptions, which are usually not noticeable. Analyzing the antinomy

⁴⁰ *Idem, Semantic Conception...*, p. 348.

⁴¹ *Ibidem*, p. 349.

⁴² *Ibidem*, p. 348.

⁴³ *Idem, The Concept...*, p. 158.

of the Liar, Grelling-Nelson's heterological terms antinomy and Richard's antinomy of definability, Tarski found another reason for their working so well. He found the main problem was the lack of linguistic awareness: people are usually not aware that there are various layers within the languages they speak every day: the language in which and the language about which they speak. Thus the ordering of languages and their internal rules may help us avoid the danger of contradiction. The logician put it in the following way:

The main source of the difficulties met with seems to lie in the following: it has not always been kept in mind that the semantical concepts have a relative character, that they must always be related to a particular language. People have not been aware that the language about which we speak needs by no means coincide with the language in which we speak. They have carried out the semantics of a language in the language itself and, generally speaking, they have proceeded as though there was only one language in the world⁴⁴.

Analysing the antinomy of the liar, Tarski isolated the conditions which have to be satisfied for proper usage of the term *true* in relation to sentences of a given language. He states that he found this out following Stanisław Leśniewski's 1922 theory of semantical categories (a theory Leśniewski had never published himself)⁴⁵.

The additional conditions mentioned are that the language in question should also have:

- established vocabulary and
- purely formal syntactic rules allowing to discern its sentences among other expressions of that language⁴⁶.

We find them explicitly indicated in the following passage of Tarski's *Truth and Proof*:

⁴⁴ *Idem*, *The Establishment ...*, p. 402.

⁴⁵ However, it was Leśniewski who, in his 1922 work, already applied his „semantical categories“ to logic and „[w]here Husserl's categories were of abstract meanings, Leśniewski, ever the nominalist, substituted categories of (concrete) expressions. Although, like later writers, he could have called the classes of expressions 'syntactic categories', he deliberately chose the expression 'semantical categories' in order to emphasize that the expressions combined grammatically are all meaningful, unlike the meaningless marks proposed by formalist writers of the Hilbert School“, cf. <https://plato.stanford.edu/entries/lesniewski/#SemCat>, 26.12.2019.) Leśniewski's theory was also the basis for K. Ajdukiewicz's *Syntactic Connection*, 1935, as K. Ajdukiewicz openly admitted, see K. Ajdukiewicz, (1935), *Język i Poznanie*, vol. I, Warszawa, 1985, pp. 222–223.

⁴⁶ A. Tarski, *Truth and Proof*, p. 68, cf. *idem*, *The Establishment ...*, pp. 402–403.

The question now arises whether the notion of truth can be precisely defined, and thus a consistent and adequate usage of this notion can be established at least for the semantically restricted languages of scientific discourse. Under certain conditions the answer to this question proves to be affirmative. The main conditions imposed on the language are that its full vocabulary should be available and its syntactical rules concerning the formation of sentences and other meaningful expressions from the words listed in the vocabulary should be precisely formulated. Furthermore, the syntactical rules should be purely formal, that is, they should refer exclusively to the form (the shape) of expressions; the function and the meaning of an expression should depend exclusively on its form. In particular, looking at an expression, one should be able in each case to decide whether or not the expression is a sentence⁴⁷.

Formal language users, if they are willing, for some reason, to modify their language and make it a semantically closed one, will have to follow certain strict instructions which include the restriction indicated below: “(Hence it follows, in particular, that demonstrative pronouns and adverbs such as ‘this’ and ‘here’ should not occur in the vocabulary of the language)”⁴⁸.

Why should anyone like to construct a semantically closed language? Maybe it would be those who do not know its negative power of destruction. Those who do, are interested in how to avoid it and why true sentences and provable ones do not always coincide in a formal theory.

Exclusion of natural languages from the SCL confirmed

When reading Tarski’s works, many persons would readily conclude that natural languages are semantically closed ones. This conclusion is too hasty. It does not take into consideration the two borders discovered by the philosopher, who defined the term, and which have been presented above. The rest of p. 7 of this paper will contain quotations from Tarski concerning the applicability of the term “semantically closed languages” to natural languages, and also explicitly denying the abovementioned conclusion. Some people would defend their opposite views using the same quote as their argument. This happened, as I have mentioned in paragraph 6 above, to Jan Woleński and myself and also, for example, to Graham Priest and myself in 2013. The latter case concerned the following quote:

⁴⁷ *Idem*, *Truth and Proof*, p. 68.

⁴⁸ *Ibidem*.

The problem arises as to the position of everyday language with regard to this point. At first blush it would seem that this language satisfies both assumptions (I) and (II) and that therefore it must be inconsistent. But actually the case is not so simple. Our everyday language is certainly not one with an exactly specified structure. We do not know precisely which expressions are sentences, and we know even to a smaller degree which sentences are to be taken as assertible. Thus the problem of consistency has no exact meaning with respect to this language. We may, at best, only risk the guess that a language whose structure has been exactly specified, and which resembles our everyday language as closely as possible would be inconsistent⁴⁹.

Tarski would not consider natural languages to be semantically closed or even apply his results concerning the truth definition to their sentences, because the lexis of these languages is changing all the time, and because they do not have an established syntax, as formalised languages do. It is so because

This language is not something finished, closed, or bounded by clear limits. It is not laid down what words can be added to this language, and thus, in a certain sense, already belong to it potentially. We are not able to specify structurally those expressions of the language which we call sentences; still less can we distinguish among them the true ones. The attempt to set up a structural definition of the term 'true sentence' – applicable to colloquial language is confronted with insuperable difficulties⁵⁰.

This being said, you may see it is not possible, according to *The Concept*, for the natural languages to be counted among the formalized ones. It is also because "John loves Mary" may happen to be true on one occasion and it may also happen to be false at some other time. According to Tarski, the fact that natural languages are not formalized ones means that they can never have their truth definition precisely formulated.

This is why we may not formalize the entire natural language in the way Kazimierz Ajdukiewicz suggested in his 1935 paper *Syntactic Connection*, and as some other authors would try to do. Among them, perhaps the most famous one is Richard Montague, Tarski's PhD student, the author of *English as a Formal Language*⁵¹ and other papers, in which he presents

⁴⁹ *Idem*, *Semantic Conception...*, p. 349.

⁵⁰ *Idem*, *The Concept...*, p. 164, Tarski's emphasis.

⁵¹ R. Montague, *English as a Formal Language*, [in:] *idem*, *Formal Philosophy. Selected Papers of Richard Montague*, ed. R. Thomason, New Haven and London, 1979, pp. 188–221.

English as if it were possible to fully formalize it, writing nothing about the limitations Tarski discovered, but explicitly excluding demonstrative pronouns and adverbs (like *t h i s* and *h e r e*), indexical adjectives (like *f o r m e r*) or quantificational ones (like *e v e r y*, *m o s t* or *t h r e e*)⁵². These are skilfully avoided, just like other ways which would facilitate the paradox construction (e.g. numerals, which could help indicate a place of a sentence on a page)⁵³. These would cause the collapse of the formal system, as we already know from Tarski.

The title of Montague's work could suggest that its author crossed the first of the borders Tarski had discovered, the one that separates natural languages from formal ones, and that his logic had not collapsed anyway. Montague did present an interesting work on formalized parts of English. The second border separates some formalized languages (of finite orders) as ones in which antinomies are an immediate danger because of self-referential expressions used in them. I do not know anybody who would manage to cross it and still use "the normal laws of logic"⁵⁴. The attempts to deny the very existence of that border (as made by the authors mentioned in paragraph 3) are not serious propositions in this respect. The authors have actually not tried to cross the border or to prove that Tarski was wrong. They simply announced that the border did not exist.

Ajdukiewicz also criticised his own idea himself, at the end of his 1935 paper, because the logic of the day did not have any abstraction operator yet⁵⁵. However, even if it does have one now, one may still read Tarski to check why he would not think it possible to treat natural languages as the ones which can be formalised. His hard work may seem weird, strange and useless. However, the author of *The Concept* himself writes the following words:

[i]n conclusion it can be affirmed that the definition of truth and, more generally, the establishment of semantics enables us to match some important negative results which have been obtained in the methodology of the deductive sciences with parallel positive results, and thus to fill up, in some measure, the gaps thereby revealed in the deductive method and in the edifice of deductive knowledge itself⁵⁶.

One may read the above passage as referring to Kurt Gödel's theorems concerning logic, which exclude the possibility of establishing the logical value


⁵² *Ibidem*.

⁵³ For more details, cf. A. Pietryga *Tarski's T-scheme...*, *passim*.

⁵⁴ Cf. A. Tarski, *The Concept...*, p. 267 and paragraph 3 above.

⁵⁵ K. Ajdukiewicz, *O spójności syntaktycznej*, p. 242.

⁵⁶ A. Tarski, *The Concept...*, pp. 276–277.

for every logical sentence. Even though it is known that a given sentence IS true, we cannot prove it in a deductive way. Tarski and Gödel obtained twin results – Tarski for truth, Gödel for provability⁵⁷. 

ANNA PIETRYGA – magister Filologii Angielskiej (UJ, 1989), doktor filozofii (UAM 1994), doktor habilitowany (UMK 2007). Pracuje w Uniwersytecie Opolskim od 1994.

ANNA PIETRYGA – MA, English Philology (Jagiellonian University, Kraków, Poland 1989), PhD, Philosophy (Adam Mickiewicz University, Poznań, Poland, 1994), made her PhD flexible – habilitatus (Nicolaus Copernicus University, Toruń, Poland, 2007). Works at Opole University since 1994.

ORCID: 0000-0002-4690-3550

⁵⁷ For details, see e.g. R. Murawski, *Indefinability of Truth. The Problem of Priority: Tarski vs. Gödel*, “History and Philosophy of Logic”, 1998, n. 19.

