Cezary Cieśliński[1]

Paradoxes of Barbara Stanosz

Professor Barbara Stanosz was a years-long lecturer at the Institute of Philosophy, University of Warsaw. In her work she mainly – but not exclusively – focused on the theory of language, particularly semantics and the issues of logical description of phrases in language (the problem of logical form). She was an author of renowned textbooks, including the famous *Ćwiczenia z logiki* [*Exercises in logic*], a vastly popular exercise book helping students to acquire the material on propositional logic, predicate logic and set theory. It is worth mentioning that besides her academic and teaching activities, she was also a social activist and a great supporter of the state's worldview neutrality. She died on 7th June 2014.

In the late 1980s, as a student at the Institute of Philosophy, University of Warsaw, I had the opportunity to attend the Professor's seminars. I first went there drawn by the seminar's topic…and whoever came there, usually stayed. The great combination of the Professor's rigor of thought with her casual style and spot-on ripostes impressed us greatly; one could feel (which is not a common thing at seminars) that she genuinely *cared* about the topics we were discussing. In some mysterious way, she was able to solve the classical problem probably known to all lecturers: how to make the course participants notice *their own questions* within difficult, often technical issues they were tackling – fascinating problems which they would later like to handle themselves.

This is exactly what happened to me. As a result, I not only became a seminar participant for years but also wrote my MA thesis supervised by the Professor. If I were asked about the source of my interest in the theories of truth, which are the main subject of my study nowadays, I would

[1] University of Warsaw, Faculty of Philosophy and Sociology.
E-mail: c.cieslinski@uw.edu.pl

indicate the conversations with Professor Barbara as the key factor. Here is the main thread of our seminar discussions: according to Barbara, the central issue of semantics was "to explain the phenomenon of understanding any sentence of a given language based on a limited number of sentences that were understood before" (Stanosz 1999: 103). In other words: when we learn a language, we (necessarily) encounter a limited number of sentences that are actually uttered by other people. How do we acquire the ability to understand new utterances (ones never heard before) on this basis? That is the question. When answering it, Barbara always emphasized the statement that understanding a sentence is nothing else but knowing its truth conditions. This is where the notion of truth comes into the foreground. Barbara tried to convince us that the definition of truth by Tarski allows us to describe the recursive procedure of establishing truth conditions, which is why it can serve to create a model description of language acquisition. The main thought here is that by learning a language, we master a procedure, or an algorithm, for establishing the truth conditions of sentences. The description of this algorithm can be drawn from the works of logicians working on truth theory (particularly Alfred Tarski).

One of the last works by Barbara Stanosz is the paper *Rozwiązywanie paradoksów* [*Paradox resolution*] published in "Semiotic Studies" in 2004. My impressions from reading this? Well, I must admit that the clarity of this work and its care for detail is something natural and obvious to me. The Professor had spoiled her students: she had got us too accustomed to some things! An understandable piece of writing with attention to detail? What else can a reader of a philosophical paper expect? It is an obvious thing, isn't it? Isn't it indeed?

A much greater surprise to me was the scepticism of the last paragraphs of the paper. They radiate a deeply rooted doubt in the perspectives of truth theory for natural language. This doubt of Barbara Stanosz is – at least for me – something new: I remember her from the seminar times as a supporter and propagator of the formal study of natural language, not caring too much about such obstacles as semantic paradoxes. Where had the change come from?

Never mind, I would soon know everything as shortly I was going to have a seminar talk on paradox resolution! I had been preparing all week long and I wanted to discuss, intended to convince, all the participants that I was right! I ran in, panting, but the only person I could see was a peculiarly aged course colleague who says, "You are too late, colleague. The Professor is no longer with us".

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The starting point of Barbara's paper is the definition of a paradox as "apparently valid inferences that lead from acceptable premises to unacceptable conclusions" (Stanosz, 2004/2015, p. 5). Let us add that a conclusion may be unacceptable for different reasons. For example, it can be obviously non-compliant with our experience – here we can categorize the famous ancient paradoxes by Zeno of Elea, arguing for the impossibility of movement. However, logicians are particularly interested in the special kind of paradoxes, for which we will here reserve the notion of "antinomy": an antinomy is a paradox that results in a contradiction.

The key condition here is that paradoxical reasoning uses premises and inferences that are *accepted* by us – and often even obvious. Not every reasoning that concludes in a contradiction is an antinomy! The exceptional role of paradoxes stems from the fact that they reveal loopholes and weaknesses in the system of our basic conceptions. According to Barbara Stanosz:

> we tend to regard paradoxes as painful blows to human reason [w]e feel [. . .] must be parried or eliminated by means of ironclad solutions. (Stanosz, 2004/2015, p. 5)

Indeed. Still, I have a strange impression that the only exception to this rule is a logician's mind. A logician is not a typical kind of person: they love paradoxes and can never get enough of talking about them.

The paper by Barbara describes the strategy of handling paradoxes. The author distinguishes four methods of solving paradoxes:

(A) to justify the thesis that the conclusion merely appears to be unacceptable when in fact it is quite natural and harmless;

(B) to show that at least one of the steps in the inference is logically invalid;

(C) to prove that at least one of the premises is false

(D) to show that a premise is nonsensical (Stanosz, 2004/2015, p. 5). I consider this description of possible strategies very fitting. All the mentioned methods are then illustrated by various examples (Solution (A) – Eubulides' paradox, (B) – Zeno's paradox of movement, (C) – Russell's paradox, (D) – the liar paradox).

In this text, I will try to illustrate all four methods by using a single example: the liar paradox. This classic antinomy turned out to be a hard nut to crack and the very existence of many unequal solutions inspires thought: wouldn't one really good solution be enough?

Let us quickly remind ourselves of the paradox here. Let (L) mark the sentence:

(L) is false.

We then ask whether (L) is true or false. We consider all the cases. If (L) is true, then it is as (L) says, so (L) is false – contradiction. On the other hand, if (L) is false, then it is not as (L) says, which means that (L) is not false – another contradiction. Thus, we get a contradiction regardless of the case considered. This is in an antinomy.

I would like to emphasize that the version of the liar paradox presented above is intuitive and non-formal. Hence, it has one feature specific for intuitive reasoning: it is not entirely clear what premises and rules are being used in it. In such situations, a logician's first task is to write down the reasoning without any loopholes or shortcuts. That said there is no guarantee that a given intuitive reasoning will correspond to one and only one full, formalized version.

I will now present the liar reasoning in a more precise shape (not forgetting the fact that this is still just one of many possible versions – this will later be important!). In the formalisations below, I assume that "obtaining a contradiction" means proving a sentence in the form "$\varphi \wedge \neg\varphi$" (where φ may be selected freely).

Liar – version 1

Let Tr be our predicate of truth. We recreate the reasoning by means of a theory T, which we assume to fulfil the following conditions:

1. T contains all substitutions of the expression $Tr(\varphi) \equiv \varphi$
2. There exists a sentence (L) such that $T \vdash \mathrm{L} \equiv \neg Tr(\mathrm{L})$
3. For any formula A, if $T \vdash (\varphi \equiv \psi)$ and $T \vdash A(\varphi)$, then $T \vdash A(\psi)$
4. For any sentence φ, if $T \vdash \varphi \equiv \neg\varphi$, then $T \vdash \varphi \wedge \neg\varphi$

Here is a short commentary. The first condition is an equivalent of the following intuitive claim: a sentence (any sentence, let us add, with or without a truth predicate) is true when it is as the sentence says. The second condition introduces a liar sentence L, understood as follows: (L) is identical (provable on the grounds of T) to its own falseness. It is worth mentioning that this condition will be fulfilled by every theory T containing a big enough fragment of first-order arithmetic, so it turns out not only possible to fulfil but even fairly natural[2]. Conditions 3 and 4 in turn characterize the fragment of the logical apparatus of our theory.

Now we can prove that the theory T defined that way is contradictory.

Observation 1. There exists a sentence φ such that $T \vdash \varphi \wedge \neg\varphi$.

Proof. Based on 2, let us take a sentence (L) such as:

$T \vdash L \equiv \neg Tr(L)$

Then we obtain:

$T \vdash Tr(L) \equiv L$ (based on 1)

$T \vdash Tr(L) \equiv \neg Tr(L)$ (based on the two previous steps and 3)

$T \vdash Tr(L) \wedge \neg Tr(L)$ (based on 4)

□

The paradox is created because the conditions for T seem natural: one *would like* our theory of the world to be exactly like T! However, it turns out that every such theory is contradictory. What shall we do?

Strategy (A) is the solution used by dialetheists[3]. Do the natural assumptions 1 to 4 allow us to obtain a contradiction? Then these assumptions are not controversial, a dialetheist will say. No doubt arises from any steps toward the proof within T, and yet they lead to a contradiction. The conclusion is simply harmless – and here is the solution! Of course, it results in a contradiction but why should we be concerned about a contradiction?

This is when a classical logician enters the stage. "We should be concerned about a contradiction because", he will say, "everything logically follows

[2]To be more precise, condition 2 will be fulfilled if within T we have arithmetic means to prove what is known as the Diagonalisation Lemma. It is fully sufficient if T contains Robinson's arithmetic.

[3]The term was introduced by Graham Priest and Richard Routley (Priest, *et al.* 1989). In Polish and English alike, the terminology is not homogenous. The more common version in English these days is "dialetheism" but one can also come across the spelling "dialethism".

from the contradiction. This is the essence of the principle *ex contradictione quodlibet*! If one accepts the contradiction, they must subsequently accept any sentence, which is not something we would wish for." However, it is exactly *this opinion* of a classical logician – let us stress, this opinion and not the liar reasoning! – that a dialetheist would deem invalid. He notes that the non-classical paraconsistent logic used by him blocks the possibility to infer any sentence from a contradiction. Obviously, a modification is introduced at this point. However, this is the type (A) solution because the liar reasoning itself is left intact by our dialetheist. Only the conclusion is made harmless.

About the strategy (B), Barbara Stanosz writes as follows:

> [It] is difficult to apply because the authors of well-known paradoxes had usually taken great care to make their inferences logically valid. The only exception I know of is an analysis of Zeno's paradox of the arrow (Stanosz, 2004/2015, p. 6).

If only for this reason, a different illustration is worth introducing. Again, I will use the liar paradox.

First, however, let us consider what exactly a solution utilizing strategy (B) entails. Every reasoning requires the use of some rules of inference. The rules should not be confused with premises: they are dynamic elements of the deductive system; they are what allow us to *move* from assumptions to conclusions. To solve a paradox using strategy (B) is to question the correctness of some rules of inference used in a paradoxical reasoning. Then we say: this rule, which we thought correct, is invalid after all.

As mentioned before, it is not absolutely clear what means the intuitive liar reasoning employs. They are only exposed by a more accurate, formal description. It has already been emphasised that the liar reasoning can be recreated in various formal systems. Let us now consider another version of it.

Liar – version 2.

Let us assume that a theory S fulfils the following conditions:

(a) S contains all substitutions of the expression $Tr(\varphi) \rightarrow \varphi$.

(b) There exists a sentence (L) such that $S \vdash L \equiv \neg Tr(L)$.

(c) The laws of classical logic apply to S.

(d) For any sentence φ, if $S \vdash \varphi$, then $S \vdash Tr(\varphi)$.

It should be emphasised that such a theory S does not need to contain all substitutions of the equality scheme "$Tr(\varphi) \equiv \varphi$". Condition (a) exclusively specifies implications, not equalities. Despite that fact, it turns out that:

Observation 2. Every theory S that fulfils conditions (a) – (d) is contradictory.

Proof. Based on (b), let us take a sentence (L) such that $S \vdash L \equiv \neg Tr(L)$. We obtain:

$S \vdash Tr(L) \rightarrow L$ (condition (a))

$S \vdash \neg L \equiv Tr(L)$ (based on the choice of L and condition (c))

$S \vdash Tr(L) \rightarrow \neg L$ (rules of classical logic applied to step (2))

$S \vdash \neg Tr(L)$ (rules of classical logic applied to steps (1) and (3))

$S \vdash L$ (based on (4), rules of classical logic and the choice of the sentence L)

$S \vdash Tr(L)$ (based on (d))

$S \vdash Tr(L) \wedge \neg Tr(L)$ (rules of classical logic applied to steps (4) and (6))

□

However, the conditions for the theory S again seem convincing and desirable. And thus, there is a paradox again; and again, we are facing the question of how to avoid a disaster.

One of the possibilities is to reject the condition (d). At this point, let us notice that condition (d) corresponds to a *rule of inference* known in the literature as "NEC"[4]. Based on this rule, we are allowed to add the expression $Tr(\varphi)$ to the proof if we have earlier proved φ[5]. By rejecting this rule, we use the (B) type strategy: what we question is the validity of one of the steps in the reasoning. This is when we say: this rule is incorrect!

(It is worth adding that some logicians have *indeed* followed this path and so invalidated the given reasoning: all steps in the above proof are

[4]From *necessitation*. This type of rule is a part of modal logics: if we have obtained a proof of a sentence φ in modal logic, we can add "it is necessary that φ" to the proof. In our rule, necessity is replaced by truth.

[5]The NEC rule should not be confused with the implication "$\varphi \rightarrow Tr(\varphi)$". Examples are known of non-contradictory theories with an unlimited (i.e. applicable to any sentences) NEC rule in which not all such implications will be theorems in that theory.

re-created in their theories except for the transition from (5) to (6). This is not an *ad-hoc* example![6])

Strategy (C) is – let us remind ourselves – to prove the falseness of one of the premises. In the case of the liar paradox, a popular move is to question some premise in the form of "$Tr(\varphi) \equiv \varphi$" (from the first version of the paradox). For example, one can claim that the truth predicate is *stratified*. The supporters of this conception argue that in fact we are not dealing with one language containing the truth predicate but a family of languages containing predicates of increasing levels (Tr_0, Tr_1, Tr_2,...), which express the truthfulness of sentences in the languages that are one level lower in the hierarchy. For instance, let J_0 be the language of the arithmetic of addition and multiplication without any predicates except for the symbol of identity. A language J_{n+1}, in turn, will be defined as the extension of Jn by a new, one argument predicate symbol Tr_n. Now we can also consider a family of T_n theories which fulfil the following conditions:

1. T_n contains all substitutions of the expression $Tr_n(\varphi) \equiv \varphi$ for the sentences φ of the language J_n,
2. T_n contains arithmetic,
3. The laws of classical logic apply to T_n.

Can we recreate the liar paradox within the theories T_n? It turns out we cannot. For instance, let us consider the theory T_0. If T_0 contains arithmetic, a liar sentence for the truth predicate Tr_0 being a part of this theory's language will exist, i.e. there will exist a sentence such that:

$$T_0 \vdash L \equiv \neg Tr_0(L).$$

However, the construction analysis of the sentence L shows that L is not a sentence of the language J_0 – in fact, L itself contains the truth predicate Tr_0 and hence belongs to the language J_1, not J_0. Other than in the classical liar reasoning, the first condition does not allow us to obtain the equivalence:

$$T_0 \vdash Tr_0(L) \equiv L.$$

Yet this is exactly the key equivalence for the inference of contradiction. Thus, we block the paradox.

[6]The entire reasoning except for the transition from (5) to (6) is recreated in the axiomatized Kripke-Feferman truth theory (known in literature as KF).

Let us emphasise the fact that stratification indeed leads to a type (C) solution. So far, we have only said that we will not obtain the equivalence $Tr_0(L) \equiv L$ within T_0. This is not a drawback of this theory; on the contrary: this equivalence being false in the intended interpretation of J_1 (i.e., the language of the theory T_0) is exactly the point. The mentioned intended interpretation is the model $(\mathbb{N}, T)$ where $\mathbb{N}$ is the standard arithmetic model and T is a subset of $\mathbb{N}$ consisting of sentence codes of J_0 (i.e., arithmetic sentences). It is then easy to notice that:

- $(\mathbb{N}, T) \models \neg Tr_0(L)$, because L does not belong to J_0, so L does not belong to T,
- $(\mathbb{N}, T) \models L$, because L is equal to the sentence $\neg Tr_0(L)$, which is true in $(\mathbb{N}, T)$.

Thus, the equation $Tr_0(L) \equiv L$ is false in $(\mathbb{N}, T)$ and it is as such that we reject it! Let us stress: this is a type (C) solution.

(As a pre-emptive remark, it is worth stressing that sentences in a form $Tr_0(\varphi)$ where φ *contains* the predicate "Tr_0" are grammatically valid. No syntactic rule forbids their construction. They are valid but false, sharing the sorry fate of sentences such as "$0 + 0 = 1$").

The last strategy described – type (D) – is questioning the meaningfulness of a premise. Only in this case (type (D)) did Barbara Stanosz illustrate the liar antinomy. What is the illustration? Barbara Stanosz writes:

> The common feature of most (variously formulated) solutions to the liar paradox is that they treat semantic notions as systematically syntactically ambiguous. What we actually have, instead of two notions "true" and "false," are infinite families of notions: "true0," "true1," "true2,"…, "false0," "false1," "false2,"…, and, furthermore, when you have a sentence predicating truth or falsity about a sentence that itself features "true" or "false" with the subscript x, syntactic coherence demands that it contain the appropriate term with the superscript $x + 1$. In light of this requirement, what we have marked as S above [L in this paper] is not a well-formed sentence of any language. (Stanosz, 2004/2015, p. 8)

This is one of the few fragments of Barbara Stanosz' article that I am forced to disagree with. By my assessment, it is fairly uncommon in today's source literature to make such a condition of syntactic coherence. The standard approach is different: for *any* one-argument predicate P and *any* term t, the expression $P(t)$ is usually deemed grammatically valid[7]. This applies particularly to predicates such as "$truth_0$" or "$truth_{500}$". It also applies to the terms which, interpreted naturally, refer to sentences containing predicates with even higher indices.

I am guessing, of course, that Barbara Stanosz wanted to characterize a language similar to that of Russell's theory of types. I also agree that such languages can be formally described[8]. The problem is, it is rarely done nowadays. Why? Well, probably because such a complication of syntax theory is simply *not viable*. We can use hierarchical truth predicates *without* complicating the syntax; we then consider the problematic "mixed type" expressions grammatical but false[9]. It is much easier this way. As a result, the syntactic rules of the theory of types are no longer "The common feature of most (variously formulated) solutions to the liar paradox" – in fact, they rarely appear there at all.

Much more often, the (D) type solution questions the *differently* (not syntactically) *understood* meaningfulness of one of the premises of antinomic reasoning. Barbara Stanosz notices this direction of thinking when mentioning the attempts to prove that:

> S [the liar sentence] is either ungrammatical or does not constitute a complete, autonomous unit of natural language and, as such, cannot be true or false; in a sense then the meaningfulness of S is being questioned here along with the role S plays in the liar paradox. (Stanosz, 2004/2015, pp. 8–9)

Let us note that, in the cited fragment, the ungrammaticality of the liar sentence is just one operand of a disjunction! Let us focus on the other operand now. Indeed, in many attempts at a solution which are popular nowadays, the liar sentence is denied logical value. If we identify meaningful

[7] In other words, the expression $P(t)$ is considered a *well-formed formula*, not a sequence of symbols from outside the set of well-formed formulas of the given language.

[8] Not only the truth predicates but also all terms of the described language, starting with simple variables, would have to have type indices. The basic restriction here would be for an atomic formula $\mathrm{truth}_i(t^k)$ to be a well-formed formula only under the condition that $i = k + 1$.

[9] Which does not mean all "mixed type" expressions are considered false. For example, the sentence "It is not true$_0$ that $truth_0$("$0 = 0$")" mixes types but is true with the intended interpretation: indeed, the sentence "$truth_0$("$0 = 0$")" contains the $truth_0$ predicate, so it is not itself subject to the given predicate.

sentences with sentences that say something particular about the world – something true or false – then the solution would be indeed to question the meaningfulness of the liar sentence.

In this case, the intuitive version of the liar reasoning does not lead to a contradiction. We have earlier considered two cases – the truthfulness of L and the falseness of L – and proved that none of them is possible. This is a good thing: that way, we know that L is neither true nor false! On a formal level, Saul Kripke (1975) described this strategy in detail in his paper *Outline of a theory of truth*. Importantly, the formal description presented in the paper does not contain any type indices: it features an established language distinguishing one predicate "Tr", which gains better interpretations at each stage until the final step, where we obtain the desired effect: it turns out that for any sentence φ, the logical value of φ is identical to the logical value of $Tr(\varphi)$. Except that... besides true and false, there is another logical value: undetermined. It might happen that both φ and $Tr(\varphi)$ are undetermined; this is what happens to the liar sentence. Moreover, a good intuitive interpretation of the "undetermined logical value" is *lack of logical value*, very much in the spirit of the strategy (D). In any case, Kripke's work shows that one can build a formally rigorous interpretation of a language containing its own truth predicate.

The finishing fragments of Barbara Stanosz' article contain a number of very sceptical remarks on the possibility of applying the solutions of the liar paradox proposed by logicians for semantic analysis of natural language. The author notes that the suggested solutions are, "[o]f course, [...] not a description of the actual use of semantic concepts in any of the previously existing languages"; they should rather be "a prescription of how to use semantic concepts in order to avoid contradiction." This remark is, by all means, justified, though the ambitions are bigger in some cases. For instance, Kripke writes:

> I do hope that the model given here has two virtues: first, that it provides an area rich in formal structure and mathematical properties; second, that to a reasonable extent these properties capture important intuitions. [...] It need not capture every intuition, but it is hoped that it will capture many. (Kripke, 1975, p. 699)

In particular, Kripke's model divorces the idea of stratification: the theory of one non-stratifiable predicate indeed seems closer to natural language than the hierarchical approach. This resonates with Barbara Stanosz' comment:

> a grammar is not an adequate description of language if it excludes from the set of sentences (as nonsensical or non-autonomous) many expressions used in communication as independent sentences. (Stanosz, 2004/2015, p. 9)

This is where one could add: in acts of language communication we indeed use one truth predicate, also towards sentences containing this predicate. A grammar that excludes such utterances does seem to be an inadequate description. Still, is that in itself a reason to be sceptical? Logicians have created tools that allow them to cope with more than one such construction!

Questioning of the meaningfulness of the liar sentence makes the author uneasy. She asks: "How can one secure such a claim? The task seems hopelessly difficult" (Stanosz, 2004/2015, p. 9).

According to Barbara Stanosz, one encounters the following problem:

> if [such a claim] is to escape the charge of being ad hoc, such a defense of the ordinary notion of truth must cast doubt on the meaningfulness of [the liar sentence] S along with a whole class of expressions with a similar structure. Yet [. . .] there are a multitude of expressions that bear close structural resemblances to S but which [. . .] raise no suspicions. More specifically, one should not dismiss as senseless all self-referring statements. (Stanosz, 2004/2015, p. 9)

The last remark is undoubtedly well aimed and applies not only to natural language. It is known that higher-order arithmetic theories have sufficient means to – in a sense – refer to the expressions of their own language (the Gödel numbers of the expressions of the language of arithmetic). I agree without reservation that to deny these abilities to natural language is not a sensible course. That said, do we have to deny meaningfulness (i.e., logical value) to sentences that "bear close structural resemblances" to the liar sentence? Having denied the meaningfulness of A, should we, as a general rule, deny the meaningfulness to all sentences with the same structure as A? This is, after all, a very dubious claim. The lack of meaningfulness might be a result of the semantic characteristics, not structural ones! It is the case in Kripke's construction. It can even happen that two simple atomic sentences – say, $Tr(t)$ and $Tr(s)$ – with an identical term-predicate structure are classified in two different ways: one determined (true of false), the other undetermined. The deciding factor is the *semantic characteristics* of the sentences, not their syntactic structure. What is wrong with it?

However, there is no pretending: there are some serious issues. One of these issues is the so-called "reinforced liar paradox", which results from the consideration of the following sentence L':

$$L' \text{is false or } L' \text{ is neither true nor false.}$$

This time, considering three possibilities (not two, as in the previous case), we once more arrive at a contradiction. The constatation that L' is neither true nor false does not help this time, for if L' is indeed devoid of logical value, it seems that L' is true after all!

This reinforced paradox is where Kripke's theory does poorly. Things are even worse: various semantic concepts from the literature encounter their own versions of the reinforced liar. I do not know a theory free from the revenge problem[10].

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The research on the applicability of new formal truth theories to natural language is in its infancy. Additionally, it must be admitted that the proposed formal theories have their own serious issues. "Nonetheless, at the bottom of existence, at its very foundations, sticks some hellish nonsense, and it is a boring nonsense too" – wrote Stanisław Ignacy Witkiewicz in his *Farewell to autumn.* I think that, having faced the unyielding matter of natural language, Barbara Stanosz would have agreed with the first part of his opinion. I could never, ever, believe that she would have agreed with the second part.

Bibliography

Kripke, Saul (1975). Outline of a theory of truth. *The Journal of Philosophy*, *72*(19), 690–716.

Graham, Priest, Richard, Routley, Norman, Jean (Eds.) (1989). *Paraconsistent Logic: Essays on the Inconsistent.* Munich: Philosophia Verlag.

[10]In literature, the name *revenge problem* encompasses a whole wide family of such problematic phenomena. We believe, to our self-satisfaction, to have solved the liar paradox when suddenly... the liar takes a revenge and comes back in the reinforced, vicious form!

Stanosz, Barbara (2004). Rozwiązywanie paradoksów. *Studia semiotyczne*, *XXV*, 27–31; English version: Paradox resolution. *Studia Semiotyczne — English Supplement*, *XXV* (2015), 5–9, translated by Witold Hensel.

Stanosz, Barbara (1999). Problemy definicji prawdy dla języka naturalnego. In *Logika języka naturalnego*. Warszawa: Polskie Towarzystwo Semiotyczne.

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