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Roman Suszko and the non-Fregean Logics

Contents

This part of the section Ontologists of 19th and 20th centuries includes of the following pages:

Roman Suszko and the non-Fregean Logics (Current page)

Selected bibliography on Roman Suszko and the non-Fregean Logics

Polish ontologists:

Kazimierz Twardowski on the Content and Object of Presentations

Stanislaw Leśniewski's Logical Systems: Protothetic, Ontology, Mereology

Tadeusz Kotarbinski from Ontological Reism to Semantical Concretism

Roman Ingarden and the Realism/Idealism Debate

Bogusław Wolniewicz on the Formal Ontology of Situations

Jerzy Perzanowski: Modal Logics, Ontology and Ontologics

Introduction

"I. Roman Suszko (9.11.1919, Podobora – 3.06.1979, Warsaw) was one of the most fascinating personalities in Polish academic community after the Second World War and one of the most outstanding logicians of the time. He was above all a scientist but he also participated in academic life. He was Dean of the Faculty of Philosophy at Warsaw University for two terms of office. He studied abstract problems of logic, but also played a part in the satirical film *Rejs* [The Cruise] directed by M. Piwowski.
Suszko was involved in various scientific problems, for example: logical syntax of natural language, liar antynomy, logical probability; but two of his achievements have the greatest value for philosophy of science, i.e., diachronic logic and non-Fregean logic.
Like Ferdinand de Saussure, who, in his monograph *Cours de Linguistique Générale* (Lausanne 1916), made a distinction between synchronic and diachronic linguistics, Suszko draws a distinction between synchronic and diachronic formal logic. Diachronic formal logic was for Suszko the application of the models theory to formalized languages in order to describe the abstract structure of the development of knowledge. Non-Fregean logic, on the other hand, was a term used by

Suszko to refer to classical logic enriched by identity connective and quantifiers binding sentential variables. The identity connective joins two sentences into a true sentence when sentences describe the same situation. It turns out that nonFregean logic is such a general logical calculus that the classical predicate calculus, classical sentential calculus, Łukasiewicz's finitely-many-valued logics and some modal systems are particular cases of non-Fregean logic. Because of some interpretational difficulties concerning the notion of situation, the logic has not gained among logicians the regard which it deserves.

(...)

In 1966, via Bogusław Wolniewicz's monograph *Things and Facts, Introduction to the First Philosophy of Wittgenstein* [written in Polish], Suszko became acquainted with Wittgenstein's metaphysical views included in *Tractatus Logico-Philosophicus*. Since that moment, a new, so-called non-Fregean period in Suszko's work began. In his Tractatus, Wittgenstein expressed his belief that names designate objects and sentences describe situations. According to Suszko, in order to formulate adequate statements concerning objects as well as situations in a formalized language, there must be two types of variables in that language: nominal variables running through the universe of objects and sentential variables running through the universe of situations.

Then, according to the famous principle No entity without identity, Suszko introduced into the language of classical logic the identity connective which is used to mark that two sentences describe the same situation. Such logical calculus was termed by Suszko non-Fregean logic. The name "non-Fregean logic" originates from the fact that it is not an assumption of this logic that the universe of sentential variables, i.e. the universe of situations is two-elements set. Non-Fregean logic is the most general extensional and logically two-valued logical calculus. Its logical two-valuation consists in that each sentence of the language for which this logic is valid, for all interpretations allowed by this logic, is either true or false. Particularly, the assumptions of this logic are classical laws: the law of the excluded middle and the law of non-contradiction. Extensionality, on the other hand, consists in that what any complex expression relates to is marked by the particular constituent expressions of this complex expression. The generality of this logic consists among others in that the principles of that logic do not put any limits on universes, and that the universe of nominal variables is not empty and the universe of sentential variables has at least two elements. The principles of non-Fregean logic require only consequent application of symbols not leading to non-contradiction, while they do not require us to assume any equality which does not result from previously assumed identities. This logic has interpretations by which it is entirely characterized from the formal point of view and which may be applied to constructing the models of the theory of situations.

In my opinion, the formalization of all ontologies assigning sentences semantic correlates that are different from their logical values and not changing, in any essential aspect, the intuition that they are the correlates of sentences and nit of names, requires non-Fregean logic or, at least, a theory based on it. However, non-Fregean logic is a logical calculus and - just as any logical calculus - it can be developed independently of its origins and philosophical motivations and without making any assumptions concerning reality. Non-Fregean logic does not establish univocal meanings of such terms as "situation" and "object", just as geometry does not establish univocal meanings of such terms as "point" or "straight" line and despite it geometry is applied to the description of the world. What is the universe of nominal and sentential values depends on the application. Similarly, in geometry or the standard models theory, it is the particular application that determines what the point or the object is.

The non-Fregean period was the most creative time in Suszko's life: during that period he wrote 36 scientific papers, all of which concerned non-Fregean logic (compared to the total of 85 publications which he wrote in his lifetime), he supervised 7 doctoral dissertations during that time, 5 of which concerned non-Fregean logic." (pp. 153)

(...)

In science, it happens that an accurate description of certain problems goes beyond the potentiality of natural language. For example, the notion of continuity could not be precisely expressed until the quantifiers were introduced. According to the standards of contemporary logic, in a given formalized language we consider as many categories of beings as many types of variables there are in a given language. In a language in which there appear only various non-sentential variables, we cannot, in turn, formulate philosophical statements concerning the world as a whole. According to Suszko, the invention in the history of human thought of such conceptions as Fregean sentential logic, Leśniewski's Protothetics and Wittgenstein's Tractatus are important, among others, as their formalized versions require languages with sentential variables contrary to theories known from

mathematics and other sciences, which require only various nominal variables. Suszko, while inventing non-Fregean logic, had apparent semantic and philosophical reasons, two of which are, in my opinion, most important:

(1) the conviction that reality should be regarded not only as a universe of objects possessing certain features and connected with certain relations, but, for more complete description of the world, reality should be also regarded as a universe of situations some of which at least are describable by the sentences of a certain language;

(2) ontological propositions can be divided into two types: a) those which are manifested in logical syntax and semantics of a language, particularly in relationships of logical consequence holding in a given language, b) those which are explicitly expressed in a object-language and which are ontological propositions that are not of metatheoretical nature.

According to Suszko, in the language of non-Fregean logic we can precisely formulate theorems concerning the world perceived after Wittgenstein as the whole of facts." (pp. 158-161)

From: Mieczyslaw Omyla, "Roman Suszko. From Diachronic Logic to Non-Fregean Logic", in: Wladyslaw Krajewski (ed.), *Polish Philosophers of Science and Nature in the 20th Century*, Amsterdam: Rodopi 2001, pp. 153-162.

An overview of Suszko's thought

"In Roman Suszko's logical writings there are to be found many remarks and reflections on the idea of logic which is closely related to his work in formal logic. Though the scope of this paper makes it impossible to deal with them all, I would like nevertheless to draw the reader's attention to some of Suszko's views concerning the philosophy of logic. The aim of this study is to call the reader's attention to the most important of them. They may be presented in a knowing way:

1. The subject-matter of logical investigations are any conceptual structures emerging from the process of world cognition. The totality of such structures Suszko calls logical material. It is linguistic in nature and given in the shape of scholarly papers, philosophical treatises and, more loosely, in disputes and lectures of various sorts. The state of logical studies at any time is largely determined by the logical material available as well as the research tools at hand, for logical structures must be based upon the structures originating in direct world cognition. Among various research tools used for studying logical material Suszko -- in agreement with the trends of contemporary logic --clearly gives priority to mathematical instruments, especially to those of the set-theoretical and algebraic type.

Logic is for Suszko closely linked with epistemology and in [5], [6] he even calls it part of epistemology or even formal epistemology. In [1] Suszko writes: "Science, the progress of cognition and natural language which plays an important part in it are the points reference for investigations in formal logic."

2. The intersubjective sense of the expressions of any language L stems from the fact the expressions of this language refer to the same reality R and that they stead in semantic relations to certain appropriate fragments of R. The understanding of expressions by language users is therefore, according to Suszko, derivative with respect to semantic relations, which hold between language and its objective sphere R. In order to study semantic relations of a language one must formalize it, and the reality must be structured within a certain framework, which is, set-theoretical in character. In logic, theory of sets and relations is usually assumed as formal theory of reality.

Set theory was even called by Suszko formal ontology, although in [4] he allows for ontologies other than set-theoretical to be assumed in semantics. However, he considers set theory as the most natural ontology for investigations within formal logic. Suszko thinks that in logical syntax two kinds of investigations can be distinguished: the classificatory-analytical and the constructive ones. The classificatory-analytical investigations are a preliminary phase for the construction of formalized languages. In [2] is presented a method of classificatory-analytical investigations, stressing the semantic aspect of the structural investigations conducted in logical syntax. In logical syntax only those kinds of expressions are distinguished whose syntactic role is closely connected with their semantic function. The simplest of such expressions are called-by Suszko "words in the logical sense". Words in the logical sense include according to Suszko: variables of all sorts-sentential as well as nominal-functors, operators and, possibly, simple names and simple sentences.

From the syntactico-semantic point of view formalized languages studied in logic are more or less exact replicas of natural languages fragments or of languages of particular sciences or hypothetical assumptions about those languages. In logic we investigate some consequences of those assumptions. In [3] [4] Suszko maintains,that

(i) all languages investigated in logic so far may be represented by a one common syntactic scheme,

(ii) there is a scheme of the relation of semantic reference which is common to all those languages. As a hypothesis which could explain these facts Suszko assumes in [6] that there is a structural syntactic frameworks, by means of which consciousness can grasp reality. This framework has been determined by "the surface of the world" as Suszko calls it in [6]. The surface of the world is anything, whatever has been an objective correlate of the discursive human consciousness, merging from the remotest past. In [6] Suszko writes: "It consists (the surface of the world) of a universe, whose elements are things, not too big and not too small, persisting in the spatio-temporal environment of the primitive man -- as well as of a characterization including simple external features of those things and the relations between them. Upon this model the primitive conceptual apparatus has been built,whose syntactic structure mirrors the ontological structure of the surface of the world".

The logical structure of a language paired with a certain fragment of reality is never arbitrary and purely linguistic but is determined by:

(a) the ontological structure of the fragment of reality to which the language refers.

(b) the semantic principles adopted.

3. The appearance in the logical material of Fregean sentential semantics, Leśniewski's protothetics and Wittgenstein's *Tractatus* has been important in the development of logico-philosophical reflection. The importance of it consists, in the fact, that contrary to theories known from mathematics and other sciences the formalized of these theories require languages with sentential variables. The sentential variables range over a universe of whatever is presentable in sentences. Suszko follows Wittgenstein in calling the denotations of sentences situations. According to Suszko situations are primitive with respect to events for the latter are objects abstracted from the former. In contemporary science only these theories are studied which are expressed in languages with nominal variables; theories of situations expressed in languages with sentential variables not being considered. In [7] is proved that:

(i) certain theories of situations are mutually translatable into theories of events,

(ii) certain algebras of situations are isomorphic with algebras of events,

and then Suszko asks:

"...What, then, makes our thinking and natural languages discriminate to some extent sentential variables, especially general and existential sentences about situations?

...however, what gives preference to theories of events over theories of situations?"

And in the same paper Suszko answers:

"This is probably due to some deep, historically motivated feature of our thinking and natural language -- a feature, whose investigation and explanation will certainly take much time and effort." These features of our thinking make us grasp world rather as a universe of objects possessing certain properties and connected by certain relations and not like Wittgenstein did in *Tractatus* as the totality of facts taking place within the logical space.

One of the aspects of this bias in our thinking is, according to Suszko, tendency (originating from logical empiricism) of shifting philosophical problems from the object language to metalanguage. For Suszko, the sentence:

(*) there is a real world

is an extralogical, ontological statement, which Suszko formulates in W-languages (constructed by himself) and whose logical consequences he studies. Suszko maintains that languages which does not contain sentential variables ranging over a certain universe cannot formalise such statements as (*) or any propositions on situational ontology for that matter. W-language (W-from Wittgenstein) have been constructed by Suszko in order to formalise the ontology of the *Tractatus*. In W-languages both sentential and nominal variables are contained as well as quantifiers binding variables of both sorts, the identity predicate end the identity connective. In those languages a logical calculus called non-Fregean logic is defined.

Non-Fregean logic is a logical calculus created by Suszko in order to formalise a fragment of the ontology in Ludwig Wittgenstein's *Tractatus Logico-philosophicus*.

4. When we define a logical calculus in a formalised language, we specify the meaning of its logical constants. But this is not always all. It may happen that by assuming certain semantic principles we can impose some quantitative and structural conditions on the universe of sentential variables. According to Suszko logic should not impose any conditions upon the universes of situations and objects, that are correspondingly universes of sentential and nominal variable, except that the set of sentential denotations should consist of least two elements and that universe of nominal variables should be non-empty. This condition is satisfied by the non-Fregean logic in contrast with the truth-functional logic (the Fregean one), whose logical thesis is, under the assumptions adopted by Suszko, that the universe of sentential variables (situations) is two elements. The non-Fregean logic is a bi-valued one, because for any admissible interpretation of a language every sentential formula is either true or false. This logic is extensional as well because the denotation of any expression is a function of denotations of its constituent expressions.

The construction of non-Fregean logic and its formal semantics seems to reveal quite a few of Suszko's views on language and logic. Some of these views might be summarised in a simplified form as follows:

The analysis of logical constructions reveals that there are least two kinds of ontological principles:
(i) those reflected in the syntax of a language and the principles of interpretation assumed,
(ii) philosophical theorems, which are explicitly expressible in the sentences of a given language and accepted as theses of that language.

Every logical thesis is an ontological theorem, there are however formal ontological theses which are not logical theorems. The rules of logical inference in a given language should not impose any conditions on the universe of situations and objects if these conditions are not theses of pure logic i.e. they are not consequences of the postulate of consistency. What is peculiar about the ontological principles formulated by Suszko is that no extralogical constant is needed in order to formulate them, for they are expressible in a language which includes logical constants and sentential and nominal variables only. Hence Suszko's ontology constitutes a general and formal theory." (pp. 175-179)

References

[1] "A Formal Theory of the Logical Values I", Polish with English and Russian summaries, *Studia logica* 6 (1957) pp. 145-237.

[2] "An Outline of the Elementary syntax", Polish, *Zeszyty Wydzialu Filozoficznego Uniwersytetu Warszawskiego*, no. 3 PWN Warszawa (1957).

[3] "Syntactic Structure and Semantical Reference I", *Studia logica* 8 (1958) pp. 213-244.

[4] "Syntactic Structure and Semantical Reference II", *Studia logica* 9 (1960) pp. 63-93.

[5] "Lectures on Formal Logic. Part I: An Introduction to the Problems of Logic. Elements of Set Theory", Polish, PWN, Warsawa (1965) 152 pp. Prepared for publication by Barbara Stanosz.

[6] "Formal Logic and Some Problems of the Theory of Knowledge. Diachronic Formal Logic", Polish, in: *Logiczna Teoria Nauki*, ed. by T. Pawkowski, PWN,Warszawa (1966) pp. 505-576.

[7] "The Reification of Situations", Polish, *Studia Filozoficzne* no. 2 (69) (1971), pp. 65-82.

From: Mieczyslaw Omyla, "Roman Suszko's Philosophy of Logic", In Jerzy Perzanowski (ed.), *Essays on Philosophy and Logic. Proceedings of the XXXth Conference on the History of Logic, Dedicated to Roman Suszko. Cracow, October 19-21, 1984*, Cracow: Jagiellonian University 1987, pp. 175-180.

Non-Fregean logic

"14. (...) The story whose outcomes are described below began with a seminar on the Tractatus organized by Tadeusz Czezowski in Torun at the end of the 1950s. The seminar was attended by Bogusław Wolniewicz, who recast its contents in original form. The results of this re-elaboration were set out in *Rzeczy i facty* [Things and facts], 1968, and in *Ontologia sytuacij* [Ontology of

situations], 1985 (some of Wolniewicz's works in English are cited in the references). During the 1960s, Roman Suszko met Wolniewicz and read the manuscript of the former book. Thereafter he developed the so-called W-languages (W for Wittgenstein) from which derive the non-Fregean logics outlined below (see the references for Bibliographical details).

Independently of the Polish logicians, Barwise and Perry developed a somewhat similar theory in *Situations and Attitudes*, As far as I know, a systematic comparison between the two perspectives has not yet been conducted.

15. Semiotic preliminaries

As we know, for Frege there were only two ontological correlates of propositions: the True and the False. All true propositions denote the True, and all false prepositions denote the False. From an ontological point of view, if all true propositions denote exactly one and the same entity, then the underlying philosophical position is the absolute monism of facts.

In what follows I shall seek to disprove what Suszko called 'Frege's axiom': namely the assumption that there exist only two referents for propositions.

Frege's position on propositions was part of a more general view. Indeed, Frege adopted a principle of homogeneity (Perzanowski, 1992) according to which there are two fundamental categories of signs (*Bedeutungen* and truth-values) and two fundamental categories of senses (*Sinn* and *Gedanken*). Both categories of signs (names and propositions) have sense and reference. The sense of a name is its Sinn, that way in which its referent is given, while the referent itself, the *Bedeutung*, is the object named by the name." (201-202)

References

Barwise, J. and Perry, J. 1984. *Situations and Attitudes*, Cambridge (Mass.): MIT Press.
Wolniewicz B. 1968. *Rzeczy i facty* [Things and Facts], Warsaw: PWN [Polish Scientific Publishers).
Wolniewicz, B. 1982. "A Formal Ontology of Situations", *Studia Logica*, 1982, pp. 381-413.
Wolniewicz, B. 1982. "Logical Space and Metaphysical Systems", *Studia Logica*, 1983, pp. 269-284.
Wolniewicz, B. 1982. *Logic and Metaphysics*, Warsaw: Polskic Towarzystwo Scmiotyczne, 1999.
Wolniewicz, B. 1985. *Ontologia sytuacij* (Ontology of Situations],Warsaw: PWN [Polish Scientific Publishers].

From: Roberto Poli, "Descriptive, Formal and Formalized Ontologies", in: Denis Fisette (ed.), *Husserl's Logical Investigations Reconsidered*, Dordrecht: Kluwer 2003, pp. 183-210.

"Chapter 6. Fregean logics.
6.1. The Fregean Axiom.
The idea of distinguishing between Fregean and non-Fregean logic is mainly due to Roman Suszko [1968]. The main feature of non-Fregean logic is the distinction made between reference, or denotation, of a sentence and its truth-value. In the logical systems defined by Suszko the distinction between reference and truth-value is embodied in a new binary connective called identity. Connecting two sentences by identity expresses the fact that the two sentences refer to the same thing (they have the same semantic correlate) while the "ordinary" equivalence connective expresses the fact that the two sentences have the same logical value.

The origin of non-Fregean logics is strictly connected with the abolition of the so called Fregean Axiom by Suszko [1975].

(...)

In the Suszko's times the situational theory of meaning did not exist. Thus the principle that the meaning of a sentence coincides with the situation described by this sentence had a purely postulative character at that time - building a situational semantics was a task for future. This task was performed by Wojcicki [1984], [1986] who developed foundations of situational semantics for Suszko's non-Fregean logic with identity. (The restricted, purely sentential version of this logic is discussed below.) He also proved the completeness theorem for this logic with respect to situational semantics. The crucial point consists obviously in the explication of the notion of a situation. This problem gives rise to many questions: what are the components of a situation?; does every situation encompass pragmatical aspects, strictly connected with the process of communication, such as the

time, the place, the addressee of an utterance?; are the truth-values situational components? There is no doubt that the situation described by the sentence
"Rome is the capital of Italy"
depends on the meanings of the words that make up this sentence but it also depends on the moment when the sentence was uttered (say, at the beginning of the 19th century or in the 20th century)".
(pp. 373-374)

From: Janusz Czelakowski, *Protoalgebraic Logics*, Dordrecht: Kluwer 2001.

"The expression *non-Fregean logic* was introduced by Roman Suszko in the article *Non-Fregean Logic and Theories* (1968). Its cornerstone is the omission of the Fregean axiom. Recall that according to G. Frege, sentences are not only true or false, but they are also names of their truth values. Hence the Fregean axiom can be formulated as follows: all true statements (likewise, all false statements) have the same common referent, the truth (respectively, the falsehood). The Fregean axiom lies at the heart of classical logical calculi. In a model for a language based on classical logic there is no universe corresponding to the sentences of the language, but only a basis for an unambiguous division of the sentences into true and false ones. The Fregean axiom can be seen as the formal counterpart of a philosophical view on the meanings of sentences.
On the other hand, the philosophical foundation of the non-Fregean logic can be summarized as follows: a description of the world is incomplete (in the non-technical sense of the word) if it consists solely of a description of objects, their properties and their relations to each other. A full and adequate description of reality should reflect also the fact that reality is a collection of possibilities, some of which are realized and which can be described with sentences. While maintaining the view that a logical sentence is always either true or false, we should also be able to take into account the fact that reality, which we want to describe, contains denotations for expressions having more than merely syntactic content. Therefore, we should acknowledge the fact that the denotations of names are objects, that the denotations of predicates are sets or relations and that the denotations of sentences are the situations described by them.
The above observations show that the basic philosophical assumption of non-Fregean logic is that the denotations of the sentences of a given language are different from their truth values; the universe of the denotations is commonly called the universe of situations. In order to be able to speak about the situations, we add to the language a new connective, known as the identity connective, which links a pair of sentences to truth when their denotations are the same in a given model, that is, when the sentences describe the same situation. According to Suszko, the identity connective is more basic than other non-truth-functional operators, for instance, the various modal operators. It is basic in the sense that it cannot be eliminated from the logics that have been used and studied without trivializing it into another name for the equivalence connective. In the general case, the identity connective is different from the equivalence connective: two sentences with the same truth value can have different denotations. In other words, the truth value of a sentence is distinct from the situation described by the sentence. Adding the identity connective to classical logic does not, however, conflict with two-valuedness. Non-Fregean logic is two-valued as well as extensional, and it is the weakest logic with that property, while classical logic is the strongest one. Moreover, two-valuedness implies that the universe of situations must have at least two elements. That is the only limitation that non-Fregean logic imposes on the size of the universe of situations. On the other hand, if we add the condition that the universe of situations has at most two elements, we obtain the classical logical calculus, and the identity connective becomes indistinguishable from the equivalence connective. In fact, the Fregean axiom claims exactly this: that the two connectives are the same. Therefore Suszko called the classical logical calculus Fregean logic and the calculus without this axiom non-Fregean logic.
Thus, in a sense non-Fregean logic is an extension of classical logic: the language for building formulae is expanded. However, from another and perhaps more relevant point of view, classical logic is a strengthening of non-Fregean logic. On the other hand, the latter provides such a general logical calculus that most known logics -- classical first-order logic, classical sentential calculus, the many-valued logics of Łukasiewicz as well as some modal logics -- can be formulated in its general framework.
One should not forget about the philosophical applications of non-Fregean logic either. Most importantly, this logic provides excellent tools for the precise formulation of an ontology, for the formalization of the correspondence theory of truth and such concepts as fact, necessity, possible

world, state of affairs and event. However, the value of non-Fregean logic does not derive solely from its applications. Non-Fregean logic constitutes an autonomic logical calculus, which can be studied in its own right, irrespectively of any connections with reality.
The sentential calculus based on the principles of non-Fregean logic is called the Sentential Calculus with Identity (SCI)." (pp. 193-194)

From: Joanna Golinska and Taneli Huuskonen, "Number of Extensions of non-Fregean Logics", *Journal of Philosophical Logic*, 34, 2005, pp. 193-206.

The Fregean Axiom (FA): *"all true (and, similarly, all false) sentences describe the same, that is, have a common referent."*

"1° How do we have to understand the abolition of the Fregean axiom in the sense of the paper? To answer this question we must follow Suszko's argumentation taken from the section 'Final remarks'. First, we have to remember that from the very beginning the author's intention was to follow essentially Frege's program without, however, accepting the axiom (FA). And pure logic, according to Frege, should be as weak and general as possible. Actually, the non-Fregean logic is very weak (cf. p. 192). On the other hand, there are in fact more important ontological reasons for abolishing the Fregean axiom. The author argues that "non-Fregean logic contains the exact theory of facts, i.e., situations described in true sentences or, in other words, situations which obtain. If one accepts the Fregean axiom one is compelled to be an absolute monist in the sense that there exists only one and necessary fact" (p. 218). Subsequently, R. Suszko takes Wittgenstein, the great opposite of Frege, to task for advocating the non-Fregean approach discussed. Let us remember that the main ontological thesis of the famous Tractatus' is, that "The real world is a totality of facts and not objects". In contrast to the Fregean logic, NFL suits the ontology of the Tractatus and is the weakest and most general two-valued logic. This is the crucial argument against (FA).
A semi-abolition of (FA) is also discussed in the paper. The idea comes from the simple possible-worlds semantics (i.e. in which relational frames of type (W, R) are considered). In that semantics, models associated with frames have just one designated element. This is referred to as the semi-Fregean postulate. The ontological content of that postulate is that there exist plenty of distinct situations, but only one among them is distinguished. But the simple-worlds semantics works only for invariant Boolean G-theories. This means that this semantics is too narrow to comprise other SCI-theories; and it implies a very undesirable ontological assertion which says that there is only one distinguished situation described by true sentences.
2° The paper under review is a summary of a period of investigation of non-Fregean logic by the author and his collaborators. Incidentally, the paper contains general remarks on many logical areas and while reading it R. Suszko appears as a logician:
Suszko's theoretical framework is the general theory of entailment relations. By 'logic' is meant an entailment relation operating on the algebra of formulas. This is an extension of Tarski's methodological ideas, dating back to the thirties, connected with the notion of consequence operation. The author teaches us that in order to learn the properties of a given entailment one must investigate its theories, i.e. sets of formulas closed under the entailment. The smallest theory of a given entailment coincides with the set of all tautologies, that is, the formulas entailed by the empty set of formulas. It is obvious that distinct entailments may have a common set of tautologies. Consequently, given a logic ⊢ and an entailment ⊢ . we ought to ask whether ⊢ . equals ⊢ (strong completeness) or whether only the sets of tautologies of both entailments are identical (weak completeness). Now, if we did not stop describing the general framework, we would have to discuss problems such as the importance of the so-called complete theories, the problem of adequacy and so on.... But the reader can easily find it in the paper. Actually, we just want to draw the reader's attention to the fact that he can also find there a lot of very deep and original remarks on the theory of entailment. As an example, let us quote the author's opinion about completeness theorems (pp. 216, 217). "Thus, we see that a completeness theorem for a logic is not a golden crown on semantics but just the beginning of it. Already the relativity of completeness theorems forces us to ask how far we can go in semantics beyond (!) the completeness theorem. To construct a logical calculus and prove a kind of completeness theorem for it (not to speak of a weak completeness theorem) appears very often as just a waste of time."

R. Suszko does not tolerate any intensional notions and contexts and he is strongly opposed to intensional formal logic. He is deeply convinced that there is no modal logic which cannot be demolished (by breaking its logical rules) by some intensional construction in natural language. Therefore, on page 200, we are warned that "the building of such logics is a kind of naiveté". On the other hand, we know that some systems of modal logic have appeared to be SCI-theories. This is the reason why the author is afraid of NFL being incorrectly understood as a kind of modal logic. If one has doubts about the non-intensional background of non-Fregean logic, one should carefully read Sections 10-14." (pp. 376-378)

From: Grzegorz Malinowski and Jan Zygmunt, Review of: "Roman Suszko. Abolition of the Fregean Axiom", *Erkenntnis*, 12, 1978 pp. 369-380.

"3. Abolition of Fregean Axiom.
According to Frege, denotations (*Bedeutung*) of sentences are logical values. Thus, each sentence denotes either Truth or Falsehood. Suszko, who sought support for his ideas in Wittgenstein, rejects this point of view. For him, the denotation of a sentence is what the sentence says about: a certain "situation". This term was chosen by Suszko to interpret Wittgenstein's *Sachlage* -- the state of affairs. Situations which exist create positive facts, those which do not exist create negative facts. Sentences having the same logical value need not denote the same. It is a certain fact that Wittgenstein knew Frege just like it is a fact that Wittgenstein exchanged letters with Russell, but these two facts are quite different, and thus two sentences stating these two facts have different denotations although their truth value is the same.
Obviously, Frege was not of the opinion that all true (or false) sentences "say the same" either. In Suszko's apprehension the differences lay in the sense (*Sinn*) of sentences and not in their denotations. For comparison of Suszko's ideas with those of Frege it is essential that neither *Sinn* itself nor any of its components is an element of the objective world. *Sinn,* is a way in which sentences are assigned their logical values (one is tempted to repeat after Ajdukiewicz "the way of how the sentence is understood"), or -- which also can be found in Frege's works -- "the thought conveyed by the sentence". The thought, let me add, understood as a certain abstract object and not an individual mental experience. The differences between Suszko's and Frege's approaches are by no means of verbal character: among the concepts used by Frege there is no counterpart for the notion of situation.
As known, the predicate calculus may be employed only to non-empty domains; analogously, in order to apply SCI -- and more generally NFL -- one must accept certain ontological theses; namely the ones given by the following semantical postulates:
S1. Each sentence has its denotation.
S2. True sentences denote positive facts while false sentences denote negative facts.
S3. The classical truth conditions are satisfied; in particular, the truth value of sentences built by means of truth connectives is determined by the truth values of its components in the usual (i.e. accepted in the classical logic) way.
Observe that S1 stands in disagreement with Wittgenstein's ideas developed in *Tractatus*. According to Wittgenstein both logical tautologies and inconsistent logical sentences are "senseless" (*sinnlose*), which however does not mean they are "nonsensical" (*unsinnige*). With Wittgenstein, nonsense is an expression which does not meet the requirements of grammar which amounts to the fact that nonsensical sentences are not sentences at all. The statement "Rome is Rome" is grammatically correct but it does not convey any information, is senseless, and consequently as it means nothing it denotes nothing.
In order for (S1) - (S3) to be satisfied, there have to exist at least two situations, one of which must be a positive fact and the other -- a negative one. This existential thesis is fundamental for the ontology of SCI. The set of ontological postulates for the entire non-Fregean logic is richer since the logic refers not only to situations but also to individual objects and sets built from them. Consequently, NFL inherits the ontological postulate of the predicate calculus stating that there must exist at least one object." (pp. 326-327)

From: Ryszard Wojcicki, "R. Suszko's Situational Semantics", *Studia Logica*, 43, 1984, pp. 323-340.

EExcerpts from his publications: Abolition of the Fregean Axiom

This paper is partly stimulated by a talk given by Dana Scott on Lewis' systems in the Symposium on Entailment, December 1971, [Scott 1971]. Any endeavour, however, to reconstruct Lewis' program or to defend it is far beyond my intention. What matters here is the following. Scott makes a great deal of propaganda on behalf of (a) the general theory of entailment relations (or consequence operations) and (b) truth-valuations. Furthermore, "a nagging doubt" in Scott's mind, concerned with possible-world semantics induces him to use both (a) and (b) and a trick of making inferences visible, to arrive eventually at the strong modal systems, S4 and S5.

There are, of course, plenty of ways to obtain modal-systems. Here, I want to call your attention in particular to the somewhat disquieting fact that the strong modal systems (but by no means all modal systems) are theories based on an extensional and logically two-valued logic, labelled NFL, exactly in the same sense that axiomatic arithmetic is said to be based on (pure!) logic [created essentially by Frege, (hence labelled FL) and well-known from text-books of mathematical logic]. This paper is not, however, another exercise in so-called modal logic. I essentially agree by the way, with Quine's comments [Quine 1963] on that kind of logic. The main subject here is the construction of NFL and its basic properties. Also, the relation between NFL and FL will be discussed. The general theory of entailment will serve as a framework for three methods of building NFL. In fact, we will arrive at NFL using truth-valuations, models and logical axioms and rules of inference.

As an intelligent reader you instantly conjecture that there must be some hocus-pocus underlying NFL. Indeed, there is. It consists essentially in following Frege in building pure logic but only to certain decisive point. Of course, you need not use his archaic notation or terminology. Also, you may easily avoid his syntactic shortcomings. For example, you are naturally inclined to keep formulas (sentences) and terms (names) as disjoint syntactic categories. But, when you come to his assumption, called here the Fregean axiom, that all true (and, similarly, all false) sentences describe the same thing, that is, have a common referent, just forget it, please; at least until NFL is constructed. At that time, I am sure, you will better understand what the Fregean axiom is and you'll be free to accept it, if you still like it so much.

The trick underlying NFL is fairly easy and also quite innocent. It is true that it seduced me successfully and I am now addicted to it. I even reject the Fregean axiom. However, I do not insist that you go so far. But try NFL cautiously. I assure you that NFL offers you an intellectual experience, unexpected in its simplicity and beauty, far surpassing all "impossible worlds". But I am frank and fair, by my nature. So I tell you keep the Fregean axiom hidden in your pocket when entering the gate of NFL and be ready to use it at once, when you feel a confusing headache. Formally, you will be collapsing NFL into FL. Informally, you will be expelling yourself from a logical paradise into the rough, necessary world.

Surprisingly enough, logicians do not want NFL. I know it from five years of experience and this is the right way of putting it, believe me. Being even so close to NFL sometimes, Logicians stubbornly strive after something else. When not satisfied with FL they choose to work with the powerset 2^I as exposed convincingly by Scott [Scott 1970]. They even can, I admit, work on it as hard as in a sweatshop. So mighty is, Gottlob, the magic of your axiom! Whatever (cheatingly) one calls elements of the index set I, the powerset 2^I remains a distinct shadow of the Fregean axiom.

If we want to follow Frege we must consent to his basic ideals of unambiguity and extensionality. To stress this point we start with his famous semantical scheme of *Sinn and Bedeutung*. It is obvious today that the abyss of thinking in a natural language does not fit into the Fregean scheme. But this is another story. Here, it must suffice to notice that we all live (and cannot completely get out of) that messy abyss with all its diffuse ghosts (in Hermann Weyl's [1940] phraseology) of ambiguity, vague flexibility, intensionality and modality. We really enjoy them. But not always. When forced to construct a theory, we try to make our ideas precise and climb to the heights of extensionality. Then, the structure of our theoretical thought corresponds sufficiently well to the syntax of the *Begriffschrift*, i.e., a formalized language which does fit into the Fregean semantical scheme." (pp.169-171)

From: "Abolition of the Fregean Axiom". In: Rohit Parikh (ed.), *Logic Colloquium. Symposium on Logic held at Boston, 1972-73*, Berlin: Springer-Verlag 1975, pp. 169-239.

"14. Final remarks.

The fight with intensional ghosts is boring, unprofitable and, may never end. But, I must finish this paper. So, I conclude with some unelaborated remarks.

1) Modal logicians think that NFL is a kind of modal logic and one badly done at that. Extensionally minded logicians consider FL as the only extensional logic. Thus, either intensional ghosts or the Fregean axiom and, everything else comes from the devil. I know this well. But, why is this so? This is a longer story. Indeed, you must first look at the history of modern logic and you will find there many relevant facts. Secondly, you must dig deeper and deeper in the nonFregean logic and its relationship to the Fregean one.

2) But, if you do that then you will certainly meet a fact which suggests that we may easily get rid of the identity connective and NFL. It is sufficient to translate NFL into FL as shown in [Cresswell 1966] by Cresswell, again. Now, this is something quite different from diffuse intensional ghosts. But things nevere are so simple as they seem. You know that translations may be better or worse and, the bad translations may not be translations at all. What always matters about translations is what are their invariants. If you ask for invariants of Cresswell's translation you will find only a few. It may be considered as a translation only if one wants to get rid of identity connective at any price. But, the real paradox is that it is impossible to get rid of the identity connective at all. What can be done is to equate it with material equivalence. Also, one cannot get rid of situations unless one agrees that thought is about nothing, or, rather, stops talking with sentences.

3) Stimulated by Cresswell's "translation" and some ad hoc construction by Slupecki I built a theory of *reification* of *situations* in [Suszko 1971]. It resembles, in a sense, what Quine called reification of universals and also the relationship between Fregean FUNKTIONEN and their WERTVERLAUFE. Reification of situations is performable within a theory in some W-language, based on non-Fregean logic, of course.

If based on a logic as strong as $\vdash$ WB it automatically leads to what we are used to talking about in probability theory, viz., events being objects constituting a Boolean algebra in ordinary sense. Finally, this theory is the basis for a translation of Cresswell's type. This translation does not preserve entailment perfectly. But, equations are translatable exceptionally well, naturally.

4) Non-Fregean logic contains the exact theory of facts, i.e., situations described in true sentences or, in other words, situations which obtain. If one accepts the Fregean axiom then one is compelled to be an absolute monist in the sense that there exists only one and necessary fact. So, you see that Fregean axiom should be abolished. Also, only the non-Fregean logic allows us to repeat with full understanding Wittgenstein's thesis that the real world is a totality of facts and not objects. Indeed, what I tried to do in [Suszko 1968] was a formal recostruction of the Ontology of the *Tractatus*, OT for short, as interpreted by Dr. B. Wolniewicz.(...) At that time, I only had a general idea of which logic OT has to be based on. Now, I may say that NFL suits OT and is the general and weakest extensional and two-valued logic.

(...)

6) Yet, this is not all. SCI-models are structures which may be considered as models of the Fregean logic which makes sentential variables trivially superflous. Thus, again, we may get rid of sentential variables and identity connective similarly as in the Cress-well translation. We may and we really do. This is the point. Of course, this fact does not discredit NFL at all but it hints to some tendency in our thinking which is codified, in a sense, by the Fregean axiom. Be it right or wrong, this tendency is certainly very strong and much older than modern logic. So it seriously calls for an explanation. This may not be easy. Why do we tend to describe the world as consisting of a single necessary fact? But, anyway, I feel

-suggested by the fact that Cresswell's translation is not so good. Moreover, one may say even that the conventional semantics which uses SCI-models is not adequate. Elements of these models are objects; but sentential variables do not actually run over any totality of objects. One cannot denote a situation by a name. It can only be described by a sentence. Thus, an adequate semantics of non-Fregean theories should use a W-language with non-Fregean entailment in it. Hence, we face the task of using(!) a new kind of language with a new entailment. I have shown to you how good this new logic is. Therefore, I think we should try to use it and I hope we will be successful. Frankly, however, I am not sure if we are able to do that." (pp. 217-220)

Referencs

Scott, D. *On engendering an illusion of understanding,* The Journal of Philosophy 68(1971), 787-807.

Quine, W.V. *Comments*, in Boston Studies in the Philosophy of Science. D. Reidel Publishing Co., Dordrecht 1963, pp. 97-104.

Scott, D. *Advice on Modal Logic, in Philosophical Problems in Logic*, edited by K. Lambert, D. Reidel Publ. Comp. 1970, pp. 143-173.

Weyl, H. *The Ghost of Modality*, in Philosophical Essays in memory of E. Husserl, edited by M. Farbes, Harvard Univ. Press, 1940, reprinted by Greenwood Press, New York, 1956.

Cresswell, M.J. *Functions of propositions*, The Journal of Symbolic Logic 31 (1966), 545-560.

Suszko, R.: *Reifikacja sytuacji* (Reification of situations), Studia Filozoficzne 69 (1971), 65-82. [Translated in English in 1994: The reification of situations. In *Philosophical logic in Poland.* Edited by Wolenski Jan. Dordrecht: Kluwer 1994. pp. 247-270]

Suszko, R. *Ontology in the Tractatus of L. Wittgenstein*, Notre Dame Journal of Formal Logic 9 (1968), 7-33.

p class="style4">From: "Abolition of the Fregean Axiom". In: Rohit Parikh (ed.), *Logic Colloquium. Symposium on Logic held at Boston, 1972-73*, Berlin: Springer-Verlag 1975, pp. pp. 169-239.