THE CONCEPT OF 'MODEL' IN SOVIET SEMIOTICS

PETER GRZYBEK

0. Introduction

This paper is concerned with the notion of 'model', as it is used in the semiotics of the Moscow-Tartu school. The first part will offer a reconstruction of how this term has been used since the 1960s by the members of this school, and it will demonstrate why the reception of this usage has caused major difficulties for many external scholars; the second part then will attempt to present a suggestion how this term may usefully be applied in contemporary semiotics, avoiding those difficulties.

1. The Notion of 'Model' in the Semiotics of the Moscow-Tartu School

Without doubt, the notion of 'model' and concepts related to it such as 'modelling system' or 'modelling activity', have been key terms within the semiotics of the Moscow-Tartu school.[1]
    In his introductory remarks to the Moscow Conference on the Structural Study of Sign Systems, Vjačeslav Vs. Ivanov, for example, as early as 1962, pointed out that semiotics is mainly concerned with models, that is, with representations of objects, which consist of a limited number of elements and of the relationships between them (Ivanov 1962: 5/201):[2]

> Like other sciences related to cybernetics, semiotics is concerned primarily with models, i.e., with forms reflecting (modeling)

objects, forms composed of a finite number of elements and relations between these elements.

(Как и другие науки, смежные с кибернетикой, семиотика имеет дело прежде всего с моделями, т.е. с образами отображаемых (моделируемых) объектов, состоящими из конечного числа элементов и отношений между этими элементами.)

In the enlarged version of these remarks, which were published three years later in a separate article entitled 'The Role of Semiotics in the Cybernetic Study of Man and Collective', Ivanov (1965: 87/36) made this point even more explicit when he maintained that "the basic function of every semiotic system is the modeling of the world" ("Osnovnoj funkciej vsjakoj semiotičeskoj sistemy javljaetsja modelirovanie mira").

In a similar way, though more specifically, Lotman quite independently of the Moscow scholars introduced the notion of 'model' into literary scholarship in his Tartu *Lectures on Structural Poetics*, which were published in 1964. In these lectures, Lotman (1964: 32) developed the idea that art in general is a modelling system, and that any artifact can reasonably be considered a model of reality (20 f.).

Without going into details, these rather preliminary remarks may suffice to state that from the very beginning of the semiotic studies of the Moscow-Tartu school, the notion of 'model' has played a significant role. This fact has been stated repeatedly by many scholars, and I only want to add one point to this common opinion, namely, that in one way or another, the concept of model has been applied quite successfully by practically all Moscow-Tartu semioticians over the years, although it has never been the topic of an explicitly theoretical discussion.

As opposed to the seemingly unproblematic usage of the concept of 'model' within the Moscow-Tartu school, scholars from without have repeatedly expressed their unease at accepting it, although here too, the concept of model has never been systematically analysed.[3] Fleischer (1989: 62), for example, in his general critique of the theoretical foundations of Moscow-Tartu semiotics, quite harshly maintains that "the concept of model of the Moscow-Tartu school is faulty and inconsistent". Let me point out one example which will serve to demonstrate how such readings may come into being, and which are diametrically opposed to the seemingly unproblematic usage of this concept within the Moscow-Tartu school. Ivanov (1962: 5 f./201), in his above-mentioned introductory remarks to the 1962 Moscow symposium, defined a model as follows:

The aim is to make these forms (models) in such a way that all the elements and objects which are present (from the pragmatic point of view of the user of the given model) in the modeled object are also present in the form (model), while the converse need not occur.

(Эти образы [модели] стремятся к такому отношению между моделируемыми объектами и образами, при котором все элементы и объекты, имеющиеся [с прагматической точки зрения потребителя данной модели] в моделируемом объекте, имеются и в образе [модели], но обратное может не иметь места.)

Summarizing Fleischer's (1989: 65) argumentation, he reads this passage as follows: according to him, Ivanov maintains that a model must contain all elements and relations of the object, not vice versa. According to Fleischer, this postulate is at variance with what Stachowiak (1965: 438), in his 'Thoughts on a General Model Theory', called the "reduction feature" ("Verkürzungsmerkmal") of a model, by which he means that a model does not comprise all characteristics of the original system it represents, but only those which seem to be relevant to the creators and users of these models.[4]

If Fleischer's reading of Ivanov's above-mentioned passage is correct, his criticism would be justified. But is his reading correct? In fact, there is good reason to assume that Fleischer's reading is not correct. One reason is that Ivanov himself, in a different text which Fleischer does not quote in this context, points out just this general characteristic of models; here, Ivanov (1981: 19) emphasizes the fact that

[...] in constructing a given model scholars consciously limit themselves in view of the consideration that a model is capable of reflecting only certain aspects of the object: other of its features, which are insignificant from the given point of view, are consciously disregarded.[5]

([...] ученые при устроении каждой данной модели сознательно себя ограничивают, считая, что в модели могут отражаться лишь некоторые стороны объекта, другие же его черты, с данной точки зрения несущественные, сознательно отбрасываются [...].)

Admittedly, this quotation is from a different text than the first one, and additionally, it was written almost 20 years later, in 1981. But the original passage, too, reads differently, as soon as one continues to read carefully the passage from which the quotation is taken. It then becomes

clear that Ivanov (1962: 6/201) talks about the diachronical development of a given model, rather than giving a static definition of this concept:

> A system possessing, from the pragmatic point of view of the given user, great modeling capacity may, at a later stage in the development of modeling systems, appear to be a set of signs without denotata.

> (Система, обладающая, с прагматической точки зрения данного его потребителя, высокой моделирующей способностью, в позднейшие эпохи развития моделирующих систем может оказаться набором знаков, не имеющих денотатов [...].)

Fleischer's interpretation is incorrect, therefore, because he reads Ivanov's initial statement as a claim about synchronic modelling processes. The reduction criterion of models, which Fleischer claims to be missing, turns out to be a given *precondition* for Ivanov's further conclusions. What Ivanov wants to say becomes clear when he names particular types of fortune-telling as a typical example, which served as a basis for important political decisions in ancient times. Due to the fact that the knowledge about the objects which one modelled, or about the relationship between object and model is different (more comprehensive) at a later point in time, in this case, there would indeed be more elements in the model than in the object (i.e. in reality), but only from a later perspective.[6]

Let this example suffice to demonstrate how external evaluations of the notion of 'model' may come into being, and which are totally opposed to its internal unproblematic usage. This does not mean that the usage of the concept of the 'model' is unproblematic, from an extrinsic perspective; but, obviously, the concept of model needs to be much more thoroughly analysed than has been done thus far.

With this perspective in mind, let us summarize the gist of some further interpretations, which will show how the notion of 'model' has been understood by semioticians from outside the Moscow-Tartu school. These analyses may be classified in two groups:

1. The first group's interpretations focus on ideological implications. According to Flaschka (1975: 58), for example, the notion of 'model' serves Lotman (whom he sees as a typical representative of Marxist aesthetics) as an "explication and specification of the Marxist thesis that art is knowledge [Erkenntnis] by way of reflection [Abbildung]". Similarly, for Lachmann (1977: 5), Lotman's concept of the work of art as a model of reality displays basic traits of Marxist reflection

theory, however reduced this may be ("eine wie auch immer verkürzte Widerspiegelungstheorie").

2. The second group's interpretations concentrate more on semiotic-terminological questions. Thus, in a similar way to Shukman (1977: 14) who criticizes Ivanov for not making clear how 'sign' relates to 'model', Burg (1990: 44), more recently, pointed out, with regard to Lotman's concept, that the concept of model is not specified as a particular sign type, and modelling activity not as a particular usage of signs. This statement is only partially true, because Lotman himself (1967: 69) pointed out that in its construction a work of art follows the principle of iconic signs; but it is just this classification, which has been submitted to critique as, e.g., by Markiewicz (1989), and others.

In addition to these general remarks and critical comments on the concept of model, it was particularly the notion of 'secondary modelling system' which has been submitted to criticism. This term was introduced during the first Summer School at Kääriku in 1964, most texts of which were published in the second volume of the *Trudy po znakovym sistemam*. In the introductory remarks to this volume by Lotman et al. (1965: 6) we read:

> It was agreed upon to understand, by 'secondary modelling systems', such systems which, on the basis of language as the primary system, obtain a complementary, secondary structure of a particular type.

> (Была достигнута договоренность под вторичными моделирующими системами понимать такие из них, которые, возникая на основе языка [первичной системы], получают дополнительную вторичную структуру особого типа.)

Two years later, Lotman (1967: 131) gave the following definition, which Sebeok (1988: 68), two decades later, would call "canonical":

> Systems at the basis of which lies natural language and which generate additional superstructures in order to generate second-order-languages, are accordingly called 'secondary modeling systems'.

> (Системы, в основе которых лежит натуральный язык и которые приобретают дополнительные сверхструктуры, создавая языки второй степени, удобно называть вторичными моделирующими системами.)

As mentioned above, criticism of the concept of 'secondary modelling systems' has been evinced by scholars from outside the Moscow-Tartu school. Again, criticism may be divided into two groups:

1. Some scholars, such as Sebeok (1988: 77 f.) for example, generally call into question the idea that natural language is a primary system at all. Instead, language itself should be considered a secondary modelling system; those texts termed 'secondary modelling systems' in the Moscow-Tartu school would then have to be called 'tertiary modelling systems'.

2. Other scholars, such as Birnbaum (1990) or Fleischer (1989), criticize a different issue, namely the fact that language is considered to be the overall dominant and the only primary system which serves as a basis for all secondary systems, both verbal and non-verbal ones.

Let us summarize at this point and draw some major conclusions from what has been said so far. As has been seen, the concept of model has been one of the key terms of the Moscow-Tartu school from the very beginning of its existence. However, whereas it has been used quite successfully and unproblematically within the school, scholars from outside have had difficulties in accepting it. It is not possible to analyse the whole matter in detail here, but some relevant points should be mentioned:

1. The concept of model initially was taken from a general gnoseological discussion, which was conducted in Soviet philosophy at the end of the 1950s. One reason for semiotics adopting this concept and relating it to general semiotic problems was the assumed *cognitive* (or *gnoseological*) function of models. It would be incorrect, however, to maintain that the concept of model simply 'replaced' the Marxist notion of 'reflection': the concept of art as a means of cognition is much older than Marxism, and it ultimately goes back to 19th century aesthetic theories. Specifically, I would not go so far as to maintain that the notion of 'model' simply replaced the Marxist concept of reflection.

2. In fact, the relation between model and sign has never been adequately discussed in the Moscow-Tartu school, and the same applies to both of these terms taken separately. When Lotman quite generally assumes that models have something to do with iconic processes, he is correct; but in no way may models be equated with iconic signs. What we are dealing with here, then, as a problem, is a missing theoretical discussion of basic semiotic terms, a phenomenon which has been shown elsewhere in detail with regard to the definition and typology of 'sign' (Grzybek 1989). How this problem can be solved, will be shown below.

3. The concept of secondary (or, if one will, 'tertiary') modelling systems, as initially defined, indeed displays a pronounced logocentrism, which overestimates the role of natural language for all non-verbal kinds of cultural texts. But still, the whole concept can be useful, if it is differently defined – we will come back to these points at the end of this paper.

Before, one point has to be made quite clearly: I do not intend to say that the notion of 'model', as it has been used in Moscow-Tartu semiotics over the last 30 years, has always been used correctly; I would not even say that it has been used consistently; and I would agree that much criticism as to its usage is justified. But for this criticism to be profound, at the least, it will be necessary to place the introduction of the notion of 'model' into its historical setting, and to reconstruct its pre-history in Soviet philosophy.

Initially, I intended to present in this paper such a historical reconstruction of how the notion of 'model' was introduced into Soviet semiotics, and I intended to reconstruct its relation to the philosophical and gnoseological discussions of the late 1950s. Not only Ivanov's, Toporov's, and Lotman's early works would have to be re-read, but also relevant texts by Štoff, Uemov, Zinov'ev, Revzin and others would have to be re-analysed. I still consider this to be a desideratum, which will yield much insight into Soviet semiotics in general, and into the semiotics of the Moscow-Tartu school in particular. But one thing made me change the contents of this paper: recent analyses of the notion of 'sign' in Soviet semiotics, and subsequent research into the semiotics of text (Grzybek 1989, 1991a, 1993a, b) support the general hypothesis that it should be possible to demonstrate an isology between sign, text, and culture (Grzybek 1989, 1991c). This work led, in turn, to current philosophical and psychological theories of text processing, which came into being quite independently of semiotic theory, and which display intriguing parallels to many ideas as to the notion of 'model', as contained in the early writings of Moscow-Tartu semiotics. In fact, these approaches may shed new light on the whole matter, and they allow us to ask many questions afresh, from a different perspective. In a way, then, the perspective of this paper has changed from a retrospective look at Moscow-Tartu semiotics to a prospective view as to the notion of 'model' as it might be useful in contemporary semiotics.

2. Text and Model

As to the semiotic status of 'text', it is important to see that Lotman's thoughts on this topic have been submitted to significant changes, since the late 1970s (cf. Lotman 1977, 1981, 1983, 1986). According to Lotman, the humanities in general, and semiotics in particular, have been

characterized by two major tendencies since the 1920s: first of all, by the conviction that "science considered only repeating phenomena and invariant models thereof", and secondly, by the assumption that "the objective of any communication is the maximally exact transmission of a particular invariant meaning".

Along with these methodological preconditions and based on a Saussurian, code-oriented semiotics, a 'text' was predominantly regarded as material in which the laws of a particular 'language' manifest themselves. In this case, a 'text' has to be understood as the manifestation in one language only: it is, in its essence, homostructural and homogeneous. Later, a 'text' came to be regarded as a "generator of meaning", which, according to Lotman, turns out to be "primarily heterogeneous and heterostructural" and which, consequently, is "the simultaneous manifestation in several languages".

If one locates natural language in the centre of a fictive scale, for Lotman, natural language can be located in some kind of intermediate position, from which movements in two different directions are possible: towards artificial languages and meta-languages at one end of the scale, and towards complex semiotic constructs such as art and other secondary systems at the other. Natural language thus serves Lotman predominantly to explain these two extremes; ultimately, however, natural language, too, is characterized by the above-mentioned 'principal semiotic heterogeneity'.

As soon as one takes on board Lotman's assumption that "every natural language text is a text in different languages, or, more exactly, is an amalgam of languages with a complex system of relations between them", it is only logical "to part from the assumption of natural language as a homogeneous semiotic system and to acknowledge its inevitable heterogeneity and heterostructurality".

It goes without saying that Lotman's remarks on the heterogeneity of semiotic processes did not arise in a theoretical vacuum; to my mind, they were parallelled (or inspired) by insights from various other disciplines to which they can be related:

a) *Neuropsychology* has been able to show that the left and the right hemispheres of the human brain process information differently; the heterogeneous results of these processes do not (primarily) depend on the nature of the material to be processed, but rather on the strategy chosen (deliberately or subconsciously) to process information. There is no agreement as to the stage and way of information integration.

b) Research on *intertextuality* has mainly had its roots in Bachtin's concept of dialogicity, which, in turn, can be related to Peirce's concept of unlimited semiosis. In this context, it has been shown that practically no text exists in isolation from other texts, and that, consequently, text

processing and text understanding always exceeds the borderline of a given text and demands reference to other texts.

c) Both *text linguistics*, which has been mainly concerned with the problem of coherence of a text, and *psycholinguistics of text processing*, which has mainly concentrated on the study of meaning construction, have arrived at the conclusion that no text is inherently coherent or incoherent. Consequently, coherence cannot be explained by linguistic means alone; instead, any theory of coherence has to take account of a recipient's world knowledge which is indispensable in the construction of meaningful texts.

Although all these fields can be proven to be closely interrelated (cf. Grzybek 1991a, 1993a, b), the last point shall be focused upon in this paper since this will lead us more or less directly to contemporary approaches of text processing as the construction of mental models.

A first step was the so-called 'constructive theory of text processing', which was presented by a group of American psychologists in the early 1970s; according to it, linguistic inputs merely act as cues which people use to recreate and modify their previous knowledge of the world. Subsequent research in the late 1970s invoked the notion of inferences; assuming that the meaning of a text is represented by some kind of combination of the linguistic content of the text itself plus inferences made by the recipient, the function of inferences was thought to provide 'missing links', or 'filling gaps', whenever a recipient needed additional information to guarantee text coherence and meaningfulness.

Elaborating these findings, more recent research has shown that text processing in general can be understood as the construction of holistic mental models, rather than as an additive-linear process. Such a mental model is constructed from the very beginning of text processing, on the basis of the available information; it is a dynamic representation, which is incrementally constructed, and which, as information grows, is specified, evaluated, and, if necessary, revised. Within this framework, inferences (and coherence) are understood not as text-based, but as processes which satisfy the requirements of the mental model. Let us look at the following example given by Collins et al. (1980):

> He plunked down $5 at the window. She tried to give him $2.50,
> but he refused to take it. So when they got inside, she bought him
> a large bag of popcorn.

Most readers face serious problems in understanding this text: they will initially imagine a scene in front of a cinema or a theatre, and they assume that "she" is a woman behind a counter or something similar; astonished that "he" refuses to take the supposed change, and surprised that

"they" (possibly "he" and the woman behind the window?) get inside, one re-interprets the whole scene and arrives at a different situation. Text processing thus indeed seems to involve the immediate construction of a holistic model which corresponds to the available information in the most probable way.

One of the basic assumptions of this line of research is the conviction that there are two kinds of representation for discourse: a superficial propositional format close to linguistic form, on the one hand, and a mental model which is close to the structure of events or states of affairs that are described in the discourse. Both kinds of representation do not exclude each other, rather they mutually complement each other. Propositional and model-like representations are heterogeneous in nature: a mental model, as opposed to a propositional description, is not arbitrarily coded, but instead it represents information analogically.

Quite obviously, this approach quite nicely coincides with Lotman's idea of the principal heterogeneity of semiotic processes (since a 'text' is conceived here as a combination of an arbitrary and a non-verbal, analogical coding); it also offers the possibility of re-defining language as a modelling system (or as a semiotic system, which includes, or involves, the construction of a mental model).

According to the proponents of the mental model concept, a mental model need not be veridical: the processes by which fictitious discourse is produced or understood are not strikingly different from those for true assertions. Such a qualification quite logically leads to the distinction of true and false assertions.

As Johnson-Laird (1981) maintains, a propositional representation is a description which is either true or false, ultimately with respect to the world. Our apprehension of the world, however, is not direct, since we possess only an internal representation of it – hence, a propositional representation is true or false with respect to a model of the world.[7] In this respect, it seems most reasonable to distinguish between the mental representation of discourse, i.e., a *discourse model*, on the one hand, and the *world model*, on the other; the discourse model thus serves as some kind of 'intermediary model' between the propositional representation and the world model, which is a complete representation of the world. This distinction allows a clearer definition as to the truth value of a given text. A text represented in a discourse model is true provided there is a proper embedding of the discourse model in the world model, i.e. a mapping of the individuals and events in the discourse model onto the individuals and events in the real world model in a way that preserves the same properties and relations. The whole concept may be illustrated in fig. 1:

Figure I
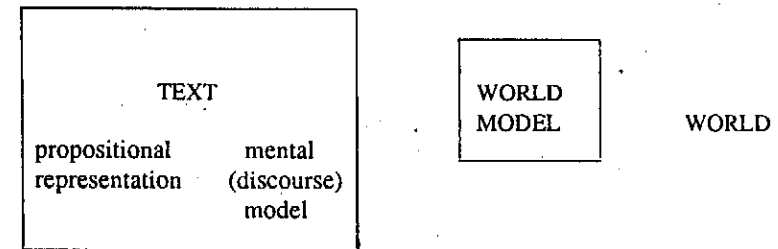
Within the mental model approach, the actual world is thus not interpreted as one possible world among others, but as the mental model of the world the individual has internalized in the course of his or her life. Thus, this internalized world model is the relevant instance for decisions about the truth value of a given assertion (or text). There remains one problem, of course: the ontological status of the world model into which discourse models are embeddable. It seems most reasonable, in this regard, to share Johnson-Laird's (1983: 402) opinion that our knowledge of reality is nothing more than another mental model.

It would definitely be beyond the scope of this paper to discuss further questions of knowledge representation in general, and to analyse the problem of how propositional and model-like representations, understood as heterogeneous semiotic processes, interact in text processing. Let us try instead to relate the mental model approach to the concept of 'model', as it was discussed in the beginning of this paper with regard to Moscow-Tartu semiotics. It seems to be justified to draw the following conclusions:

a) Natural language can indeed be considered a modelling system, since it involves the construction of mental models. These models are analogical (or iconical) in nature, but they are not the only mode to represent the contents of a text. In this sense, then, natural language actually reflects what Lotman terms the "principal semiotic heterogeneity".
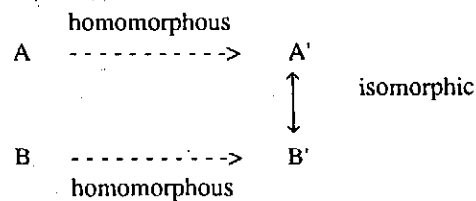
b) The semiotic heterogeneity of a 'text' not only generally confirms the idea of semiotic heterogeneity; it also makes the claim of an isology between 'sign–text–culture' more and more convincing (cf. Grzybek 1991b).

c) Although mental models are analogical by nature, their generation is not restricted to iconic signs; nevertheless, iconic components are indispensable from the construction of discourse models, by whatever kind of signs they may be generated.

d) Since a mental model need not be veridical, but can instead be fictitious and may involve true or false assertions, it is necessary to realize that within this framework, a literary work of art cannot be distinguished from an everyday statement. Given this circumstance, the notion of a 'secondary modelling system' will have to be reflected anew. It might turn out to be useful to re-define a secondary modelling system not as a structure which is superimposed upon language or constructed like it, but as a structure to which, on a secondary level of signification, cultural concepts (semantic oppositions) are attributed which, instead of the original input, serve as the basis for interpretation. If this re-definition should turn out to be useful, it will be necessary to acknowledge that secondary modelling systems represent only part of art in general, and that art is not restricted to secondary modelling systems.

In an attempt to relate the above thoughts on mental models to model theory in general, and to the notion of 'model' in Soviet scholarly discourse, one can state that these thoughts fit nicely into Gastev's (1963: 481) general definition of model. According to this definition, two systems A and B can be considered to be models of each other, if it is possible to construct a homomorphous projection of system A onto a system A', and of system B onto a system B', so that A' and B' are in an isomorphic relationship to one another (cf. figure 2):

Figure 2

homomorphous

A   - - - - - - - - - ->   A'

                              ↑   isomorphic
                              ↓

B   - - - - - - - - - ->   B'

    homomorphous

On the whole, there are many open questions as to the notion of 'model' in semiotics, in general, and in the Moscow-Tartu school, in particular. It would be presumptuous to offer answers to all questions raised; but I am convinced that thus far we have not been asking the proper questions, as far as the concept of 'model' is concerned.[8]

NOTES

[1]   For general remarks on this problem see, e.g., Eimermacher (1976, 1981), Grübel (1976).

[2]   Quotations are given both in the Russian original and in English translation; when a standard English translation is available, references include two page numbers: the first refers to the Russian original, the second to the translation. The sources are given in the references.

[3]   The only detailed discussion of this topic within the Soviet Union (though not within the Moscow-Tartu school) is the one by Losev (1978). In general terms, Losev estimates the works of this school very highly. As to the notion of model, however, this holds true only as long as it is used in an everyday meaning; as soon as a critical usage of this notion is needed, Losev (1978: 233) sees the danger of inexact and ambivalent methodological conclusions.

[4]

    Modelle erfassen nicht alle Eigenschaften des durch sie repräsentierten Originalsystems, sondern nur solche, die den jeweiligen Modellerschaffern und -benutzern relevant scheinen.

[5]   The English translation is taken from Rudy's (1986: 566) survey on 'Semiotics in the U.S.S.R.'.

[6]   What comes into play then, is the fact that there can be no objective knowledge about the objects being modelled, which is valid independently of time and user. Stachowiak (1965: 438) characterizes this issue very convincingly:

    To know, firstly, that *not all* original features are comprised by the corresponding model, and secondly, *which* original features are comprised by the model, naturally presupposes the knowledge of *all* features both of the original and of the model [...]. As can be seen, the exact comparison between original and model always presupposes an *artificial*, a 'made' original. Strictly speaking, it is not possible in case of *natural* objects.

[7]   What is understood here as a 'world model' is different from (and more comprehensive than) what is usually thought to be a world model in the semiotics of the Moscow-Tartu school. It encompasses all our internalized knowledge of the world, and it seems reasonable to assume that this knowledge, too, is heterogeneously represented. With regard to Popper's distinction of three worlds, the world model of the mental model approach would have to belong to World II, whereas the world model of the Moscow-Tartu school would be part of World III.

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THE CONCEPT OF 'MODEL' IN SOVIET SEMIOTICS

PETER GRZYBEK