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THE LOGICAL BASIS OF SEMIOTICS¹

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When we want to say something, we often use words. By using words, sentences, phrases we convey information, conjecture, protest, question, command, we tell a fairy tale, we share our impressions, we reprimand, we confess. Linguistics answers the question of how it happens that meaning is contained in words. Often, however, meaning is conveyed without words. We can tell something about ourselves or the situation we are in by wearing certain attire. In some circles the lady of the house shows respect to guests by wearing an elegant dress. The New York Court of Appeal forbade a Catholic priest from wearing his cassock and clerical collar when he was acting as a lawyer in a criminal case. The Court decided that the collar was 'a permanent visible message to the jurors' and thus made fair trial impossible.² Barbach's³ photographs present eminent businessmen in impeccable shirts and ties, with the standard faciale expression emanating success, comfort, self-confidence and the obviousness of deserving trust from others. Today, businessmen look differently than kings on paintings from the 18th century (just as from nearly all other centuries) in the 'king of realism' style. The monarch may sometimes look pompous and self-important, but his face never shows curiosity. This was supposed to mean that any debate with

¹(This paper was originally a lecture held at the semioticians' meeting in Tampa, Florida in July 1975. In this version, I have omitted one paragraph which seemed questionable.

²*The New York Times*, 8 April 1975. There was an appellation to the Supreme Court, which has confirmed the judgement.

³A US photography company with workshops in several cities, specialising in portraits of well-off people.

him was impossible. Napoleon's portrait painted by Jacques-Louis Davidis, however, differed in this respect: it shows a strong and energetic man next to his work desk, with an ink stain on his white trousers.⁴ Napoleon, a monarch on his own initiative, liked this painting and never allowed the stain to be painted over.

Semiotics deals with meaning conveyed by any means, not only through language. It is therefore more general than semantics.⁵ For the properties that define meaning, I will use the term SEMIOTIC PROPERTIES. Semantic properties are those semiotic properties that are properties of speech. But language has not only semantic properties. A sentence can be long, can contain seventy words, of which twenty are one-syllable words. These are not semantic properties, although in some unique cases they too can influence semantic properties, i.e. the meaning of the sentence. Similarly, various objects have meaning: paintings, buildings, musical compositions, customs. But not all properties of these objects have a meaningful role. Paintings have length and height, can weigh several kilograms and can be sold. These properties of paintings are not semiotically important. Paintings can also have aesthetic value, but aesthetic values are not semiotic either. One of the main difficulties in developing semiotics as an area of systematic research is the differentiation between those properties of objects that play a role in meaning and the non-semiotic properties. In particular, semiotics does not need to concern itself with aesthetic values. Linguistics has developed quickly when it ceased to focus on how beautiful or well-styled a text is. In the long run, the fact that linguistics did not analyse sentences as artistically valuable proved beneficial even for stylistics, which now draws upon the achievements and techniques of general linguistics. Progress in science requires narrowing down the subject. The social history of art records what the different classes liked in different epochs, without judging whether they were right or whether they had good or bad taste. Iconography deals with the content of works of art, not their social role or artistic values.⁶ Iconography is a part of semiotics just as semantics is another part of it. Semiotics can learn a lot from both semantics and iconography although the specific methods of semantics or iconography are too strictly related to their subjects — language and plastic arts — to be directly used in semiotics,

⁴However, there is no stain on the copy of the painting in Washington.

⁵The idea that semiotics is more general than semantics was borrowed from R. Jakobson.

⁶The basic ideas of iconography can be found e.g. in works by E. Panofsky (1955: 26—54) and M. Schapiro (1973).

which is supposed to analyse meaning, wherever it may appear. The model theory, which is the part of logic examining the relations between formal languages and their possible interpretations, is also a part of semiotics. In this case it is also clear that semiotics cannot emulate the model theory in detail, for the most essential steps in the model theory are based upon the structure of formal languages and it imposes restrictions on what can be adopted as a model. Only some very general considerations of the model theory can be useful in semiotics and will be used later in this article.

In order to accurately grasp the semantic role of a linguistic utterance or the semiotic role of any communicative behaviour, let us first observe that our utterances not only convey content but also say something about us. Our way of speaking reveals where we come from, what social class we belong to, what our occupation is, in what matters we are ready to speak confidently; it reveals whether we are organised or chaotic, arrogant or polite, sophisticated or stupid. Recipients form an opinion about us based on what and how we say, even if we are not speaking about ourselves but rather about bird-watching, Giacometti or the category theory. Recipients draw conclusions not only from what we have said but also from the fact that we have said it. But this is not at all the same. Sentences do not announce that they are being uttered. Nothing in the sentence says anything about the sentence or the person who has said it. The sentence only means what can be concluded from its content. When I say that Epicurus performed euthanasia on himself, the recipients are directly informed that Epicurus performed euthanasia on himself. They can conclude that Epicurus voluntarily took his own life. Indirectly, from the very fact that I have said this sentence and not from the sentence itself, the recipients have learnt something about me. Namely, first of all, that I know that Epicurus performed euthanasia on himself. Further, with various degrees of justification, that I had read a book about Ancient philosophers, that I am interested in Ancient philosophy or Epicurean philosophy, or that the problem of euthanasia fascinates me. The recipients may be surprised by why I have chosen to say that he *performed euthanasia on himself* instead of *committed suicide*. They may also guess that I have read about this event in Diogenes Laertius' work, where it is described in detail. But I have not said any of these. The issue here is the difference between what I have told them and what they have noticed themselves. I have told them something about the circumstances of Epicurus' death. They can rightly conclude from this that Epicurus decided to end his own life. From what my recipients have noticed, they can conclude that I know Diogenes Laertius. From Euclid's axioms follows a set of theorems

about figures, lines, sets of points, but nothing about Greek culture, while the fact that Euclid has written his axioms tells us a lot about the Greek culture of his times. We can state the presence of a refined, abstract intuition and the use of an axiomatic system.

The concept of noticing is not a semantic or even semiotic concept, although we sometimes use the term 'sign' when talking about noticing. We notice that wood becomes soft and we take it as a sign that it is eaten by termites. We notice that our friend is coughing and we conclude that he has bronchitis. But nobody had told us about this softening, about termites, coughing or bronchitis. How we notice and how we generally acquire knowledge does not belong to semiotics. The only acquisition of knowledge that semiotics is interested in is the reception of a message by the very fact that something has been said to us. A piece of wood does not tell us that there are termites inside it. Nature generally does not tell us anything, even though poets use this metaphor a lot. Various systems of communication tell us this and that. I am not trying to define systems of communication here. I only want to differentiate between the fact that something is said and the fact that we notice something. Speaking, even in a generalised sense, is always in some 'language', in a 'system', in English or Italian, in conventions regarding attire, in a tonal system of Western music (before Webern and Schönberg). It is possible that our entire noticing takes place in some 'categories of mind' or even that such categories are linked to the language in which we formulate the reports from our observations. But those are much broader questions than the ones we are discussing here. We can see that ink is black if we have good eyes. But we understand the sentence *Ink is black* if we know English. We have been told that ink is black if we have listened to the sentence *Ink is black* and we know English or if we have listened to the sentence *Inchiostro é nero* and we know Italian. Similarly, a painting tells us something if we not only see colours but also can order colour spots in proper sets, can interpret them and know the style in which the painting has been painted. Otherwise, we either see the painting asemiotically, as a play of colourful spots, or we understand it incorrectly.

An example of an asemiotic interpretation is listening to music and noticing that it has a triple metre with accent on the first note and distinguishing this rhythm from triple metre with accent on the third note but not knowing that the former is meant for dancing a waltz and the latter for dancing a mazur. Many aesthetic impressions can be asemiotic, for instance the experience of rhythm in the distribution of pilasters on the façade of a

Renaissance palace.⁷ Someone may give an asemiotic interpretation to an object that has already been semiotically interpreted by him and thus overlay it with yet another structure. For example the façade of Notre Dame in Paris can be seen, and often is, as a composition of two equal squares overlapping each other by half. Art historians are not in agreement whether this structure has a semiotic equivalent, that is whether it expresses something.⁸ We can see the proportions of the façade, but this does not tell us anything.

There are also borderline cases between situations in which something tells us something and noticing. A recorded tape tells us that the telephone number we have selected is not working. In this case, the person who said it is not talking to us directly. When the tape was being recorded, the reciting person was addressing anyone who could choose any non-working number. Short interrupted signals tell us that the line is busy, while long signals tell us that it is free. The speaker in all these cases is probably the telephone system that is the exchange partner in our culture. By selecting the number, we are telling the system that we want a certain connection and it either fulfils our demand or tells us that and why it cannot fulfil it. But when there is no sound in the receiver, when it is silent, the system does not tell us anything. We are outside it. We are not connected to it. We notice that we are outside the system and that our phone is not working. This example also shows that a communicative intention in the process of communication can be moved to the far background.

It is a difficult task to explain the meaning of a sentence, painting, building, or sonata. All the previous debates (and there were lots of them, starting with Plato) clearly show that it is naïve to think that a part of a painting represents something and the meaning of the entire painting is just the sum of the meanings of its parts. Moreover, it also seems pointless to assume that a painting contains symbols that replace something, represent something or mean something. This is true both for abstract, objectless art and for realist paintings. Representational denotative semiotics says that a

⁷The distinction between semiotic and asemiotic interpretations was discussed by S. Ossowski (he used the terms 'semantic and 'asemantic') in his important book *The Foundations of Aesthetics* (1978).

⁸Many medieval buildings have simple geometric proportions of squares, equilateral triangles, etc. Some historians believe that it is linked to Pythagorean and Platonian claims that ideal proportions in the universe have simple geometric proportions, and this view dominated among theologians from Chartres in the 12th century. Others suppose that the simplicity and frequency of occurrence of these proportions stems from the fact that medieval masters did not have good measurement tools (Tatarkiewicz 1962).

part of David's *The Death of Marat*⁹ represents Marat's body, another part a knife, another a towel, and yet another a drop of blood. But we will not go far by using representational semiotics. No part of the painting, no symbol, replaces death or the fact that Marat's body is lying in a bathtub. The bathtub has not even been shown. It is completely covered by towels, sheets and blankets. We can conclude that there is a source of light somewhere over Marat's head but this lamp, candle or window are not shown in the painting. We draw this conclusion from the distribution of shadows and the technique in which the wall has been painted, making the wall darker when closer to the supposed source of light and gradually lighter towards the other side. The whole scene, therefore, seems bigger than what is shown within the frames. The painting reveals a lot of facts. More strictly speaking, many English sentences can be derived from the painting, together making up the meaning of the painting. Therefore, I will not say that the painting presents Marat, towels, a knife, etc., but that it follows from the painting that Marat's body is lying in a bathtub, that the blood is drying up, that there is a lamp, a candle or a window to the left of his head, etc.

Natural language is similar. The meaning of a sentence is, colloquially speaking, the collection of its consequences. A bit less colloquially, the meaning of a sentence is composed of all sentences that can be inferred from the first sentence together with other known or assumed sentences. For we do not conclude from one isolated sentence but rather from a sentence taken together with many other, usually trivial sentences that are passed over. Even more strictly speaking, the meaning of a sentence is the difference between conclusions that can be drawn given this sentence and the conclusions that can be drawn without it.

Let A be a set of assumptions,¹⁰ $Cn(X)$ a set of conclusions of X , $X \cup Y$ set X expanded by set Y , $X - Y$ set X with the exclusion of elements of Y , $\{\alpha\}$ a set containing α as the sole element; $\alpha \in X$ reads: ' α is an element of X '.¹¹

⁹Brussels, Musée Royal des Beaux Arts.

¹⁰These are not only the assumed sentences about which we do not know whether they are true or not. Among A there may be both asserted sentences and hypothetical sentences.

¹¹In order to accept such sentences as (1) and (2), etc., one does not necessarily need to believe in the existence of sets as some beings that are different from buildings, tables, paintings, people or sentences. To say that *Janine is an element of the set of women* is the same as to say that *Janine is a woman*. The expression ' α is an element of set A ' is a convenient turn of phrase. This expression in this sense should be carefully distinguished from speaking about sets in a different, collective sense. Hence,

$$(1) \text{ Meaning } (\alpha, A) = Cn (A \cup \{\alpha\}) - Cn(A),$$

The meaning of a sentence, thus defined, can change if set A of assumed sentences changes. In some research it is assumed that set A of the assumed sentences is fixed (e.g. common knowledge of a language group). In others, it is believed that A changes over the course of the conversation.¹² In a borderline case, A can be empty and then we are dealing with the meaning of sentence α in isolation. What I am referring to here is the informative meaning, not the psychological meaning, for example. Psychological meaning can be useful in checking how surprising some utterance is and what its commercial value is. In linguistic semantics, informative meaning is useful and we could try to use a similar thought in more general semiotics, where α is not a sentence but a behaviour, attire, picture, musical composition, building, etc. In order to examine the extrapolation of logical semantics on general semiotics, let us take a closer look at the concept of consequence, which we used to define meaning.¹³ Logicians adopt the following rules for

if Janine is a lawyer, we can say metaphorically that she is an element of the set of lawyers. But we can also say, this time literally, that she is a member of a bar association. Because the bar association is indeed an organisation composed of Janine and other members. Just as a painting is a collection of dots, spots, paintbrush strokes, and a building is a whole composed of its parts, bricks, stones, tiles used for construction. In the first, distributive sense, the term 'set' is redundant. In the second, collective, it is not redundant at all. (1) can be read, even if not as robustly, but philosophically less misleadingly, in the following way:

The meaning of sentence α because of sentence A are those common conclusions from A and α that are not conclusions from A .

As a result of this approach, MEANING becomes also just a form of speech. Indeed, some sentences are meanings of a sentence and the adopted assumptions. But as I am not certain of the existence of sets or other beings, including paintings, sentences and Janine, therefore I can just as well use the phraseology of the set theory as the outlined phraseology of concretism, provided that I will not confuse the collective sense of 'set' with the distributive one. This distinction is derived from Leśniewski's ideas. My sceptical approach to the existence of anything is described in *The Alethic Semantic Theory* (Hiż 1969) and in *On the Assertions of Existence* (Hiż, 1973).

¹²This is the starting thought for new research on presuppositions conducted by Richard Smaba.

¹³I use the terms 'consequence' and 'conclusion' interchangeably. Being a conclusion is a relation between a sentence and a set of sentences. In the language of logic, we use the concepts of sentence and of predicate. A predicate becomes a sentence after variables are replaced with fixed values. In formalised systems, apart from the relation of collusion between a sentence and a set of sentences, we often use a derivative concept of conclusion as a relation between a predicate and a set of predicates. In natural

this concept.¹⁴

(2) If $\alpha \in Cn(A)$, then $\alpha \in S$ and $A \subset S$.¹⁵

If α is a conclusion from A , then α is a sentence, while A is a set of sentences. Naturally, sentences belong to a language, and the concept of conclusion is relativised to the language.

(3) $A \subset Cn(A)$

Each set of sentences is contained in a set of its consequences. In other words, each sentence among A is a consequence of sentences A . In particular, each sentence is a consequence of the set, of which the sentence is the only element.

language the concept of sentence is complicated by multiple factors. Therefore the difference between a variable and a fixed value is not clear in English (and other natural languages). In the complex sentence *If Janine comes, give her this letter*, the pronoun *her* refers to *Janine*. Therefore, it is not a variable. The conclusion from this text is *Give this letter to Janine if she comes*. Often it is impossible to find in the immediate surroundings of a sentence the expression to which a pronoun or null subject refers. *I asked him to go on vacation. All our colleagues have already had their leaves. But he did not agree* is a text from which we can conclude that *He did not agree to go on vacation*, and we treat the subject as a variable. This example shows another important difficulty encountered when we want to achieve a more precise definition of the concept of an English sentence. *But he did not agree* cannot stand on its own. It needs context, for example the one in which it was used above. Due to the relations between adjacent sentences, the conclusion from a text composed of two sentences is not necessarily the same as from each of them separately or even from an (unordered) set of sentences. And what follows from one of them does not necessarily follow from the two-sentence text. Example: *The guests are having fun. Almost everyone is drunk*. It follows from none of these sentences nor from their set that almost all guests are drunk, that there are non-drunk guests, etc., while from the two-sentence text it does not follow that almost everyone is drunk. A further difficulty in making a more precise definition of a sentence is the fact that natural language knows various types of sentences: declarative, interrogative, imperative, hortative, etc. Formal linguists try to translate all different kinds of sentences into declarative sentences. Zellig Harris (1978) translates the interrogative sentence *Who cooked dinner* to *I am curious whether Michael cooked dinner or George cooked dinner or Christine cooked dinner*. In my article *Difficult questions*, I am trying to treat the question and the answer to it as one declarative sentence (Hiž 1978).

¹⁴These principles have been formulated for the first time by Tarski (1956: 31, 32, 63, 64).

¹⁵'S' stands for 'sentence', while \subset is the inclusion mark. Therefore \subset can be read as 'all A s are sentences'.

(4) $Cn(Cn(A)) \text{ — } Cn(A)$

It is the closure principle. Conclusions from a set of sentences are just conclusions from this set of sentences.

(5) If $\alpha \in Cn(A)$, then there exists a finite set B such that $B \subset A$ and $\alpha \in Cn(B)$

It is the compactness principle. If a sentence is a conclusion from a set of sentences, then it is also a conclusion from a finite part of this set. Whatever follows from infinitely many sentences, follows from a finite set of these sentences.

Usually, some other principles of consequence are mentioned as well, namely those that show how the concept is linked with structures characteristic of a given language. For the purpose of the language of logic it is asserted that a contradictory set yields any sentence as a consequence.¹⁶

(6) If $\alpha \in Cn(A)$, then $Cn(A \cup \{\text{not-}\alpha\}) = S$.

In rules (2)—(5), the concept of consequence was used in a very general meaning. There may be many more precise concepts of consequence. One particular case of consequence is often used, namely provability: α is

¹⁶The word 'not' is an expression of the language of logic. In rules (1)—(5) we do not use expressions of the examined language and therefore they apply to any language. In Polish, for example, there is an abundance of negatives and the role of 'no' and words replacing 'no' play various roles. In natural languages, not all negatives are repeated. Moreover, most cannot be used even twice. The Polish sentence *Józef nie ma żony* (*Joseph does not have a wife*) cannot be negated in the same way as *Józef ma żonę* (*Joseph does have a wife*), that is by adding the word 'nie' ('not') before the verb and changing the object case. It can be negated using a different method, for example *Nie jest tak, by Józef nie miał żony* (*It is not the case that Joseph does not have a wife*). The changes that are required here are much different than those introduced according to the above rule. It is also not entirely clear what exactly is being negated. *Janina w poniedziałki nie jeździ tramwajem* (*Janine does not ride the tram on Mondays*) suggests (suggestion is slightly weaker than consequence) that Janine uses the tram on some other days of the week, but not on Mondays. *Janina w poniedziałki nie jeździ tramwajem na gapę* (*Janine does not ride the tram on Mondays without a ticket*) suggests both that Janine rides a tram on Mondays and that on some other days she rides it without a ticket. The range and strength of the negation therefore depend on the structure of the negated sentence.

provable from A if there exists a finite sequence of applications of certain consequence rules stemming from sentences A and ending with α . Another particular case of the concept of consequence is semantic consequence, which is the preservation of truth; α is the semantic consequence of A if α is true whenever all sentences in A are true, which means that regardless of how we understand the sentences in A and how we interpret them, if they are true in a given interpretation, then sentence α is also true in this interpretation.¹⁷ The different concepts of consequence are by no means equivalent, but they all have the properties described in rules (2)—(5).

When starting with semiotics, we want to have a concept of consequence from a picture and a set of sentences rather than from sentences. We conclude from what we know or assume (even just temporarily, fictionally or for fun) and from the picture. Therefore, it seems suitable to include some other objects apart from sentences into our deliberations. These objects can be called meaningful objects (Mo). Sentences are meaningful objects and thus semantics of a natural or formal language is a particular case of semiotics. Just as sentences belong to a certain language, meaningful objects belong to a certain convention. There is no point in talking about a sentence in isolation from any particular language, just as there is no point in talking about the meaning or content of a picture outside a certain convention. Something may have a meaning in Christian iconography, for example an aureole, while it might not have any meaning in Muslim or Buddhist iconography. Or it might have a different meaning. The eagle on the Polish coin is not a symbol of the Gospel of St. John but of the Republic of Poland. What is seen as an image of flowers depends on the style, period and culture.¹⁸ In all statements here, when there is a sentence S , it must be treated as ' S in language L ', and when there is a Mo , it must be read as ' Mo in convention C '.¹⁹ We can generalise the concept of consequence to the concept of semiotic consequence ($Iocn$) and we can provide the rules governing this concept.

(7) If $\alpha \in Iocn(A)$, then $\alpha \in S$ and if $\beta \in A$, then $\beta \in Mo$ or $\beta \in S$.

¹⁷This concept was also introduced into the literature on logic by Tarski (Tarski 1956: 409—420).

¹⁸Many have written about this. N. Goodman reminds us about it in rather strong words (Goodman, 1968: 37—39).

¹⁹The word 'convention' can be misleading. I do not want to suggest that people really make contracts on meaning. Such conscious acts are exceptional. Languages are also not defined by contractual conventions. Instead of the term 'convention', some people use 'system' or 'a system of symbols'.

If α is the semiotic consequence of set A , then α is a sentence of a given language and every element of A is either a sentence of this language or a meaningful object in a given convention. A particular example of conventions in which there are meaningful objects are languages with their sentences. Thus semiotic conclusions are sentences following from meaningful objects (ritual, drawing, etc.) and from the assumed sentences.²⁰ Semiotic conclusions contain conclusions from the assumed sentences:

(8) If $\alpha \in Iocn(A)$ and $B =$ the set of all sentences in A , then $Iocn(B) = Cn(B)$.

The closure principle is similar to (4):

(9) $Iocn(Iocn(A)) = Iocn(A)$

There is also the delicate matter of compactness in application to semiotic consequences. Using (5), if α is the semiotic consequence of a meaningful object and a set of assumptions, then a finite number of these assumptions should be enough to conclude α . Moreover, if we are dealing with a set of semantic objects, then a finite subset of these objects is enough to conclude α .

(10) If $\alpha \in Iocn(A \cup B)$, $B \subset S$ and for no β it is true that $\beta \in A$ and $\beta \in S$, then there exist finite sets C and D such that $C \subset A$, $D \subset B$ and $\alpha \in Iocn(C \cup D)$.

We can question the truthfulness of rule (10), as well as (5). There are higher-order formal languages for which (5) is false. Therefore before we agree to apply (10), we have to examine the convention in which the objects concerned and the grammatical properties of the assumed sentences were created. This is a complex matter, and future semiotic research should bring results concerning the applicability and limitations of (10), which in turn will contribute to the understanding of the differences between formal structures of various conventions. It is worth adding that yet another type of

²⁰It is unclear whether conclusions can be drawn from meaningful objects that are not sentences without using some assumed sentences. If it is impossible, then it would be suitable to add a supplementary condition to (7): there is an a in A such that $a \in S$. If apart from the assumptions a picture has certain sentences as its conclusions, it does not mean that someone really utters these sentences.

compactness can be interesting as well. Namely, instead of speaking about the compactness of assumptions, we can consider the compactness of the picture itself. There are meaningful objects in a given convention that contain as a part (in the case of paintings, a physical part) another meaningful object in the same convention. If we divide David's painting into two halves with a vertical line, the left side will remain a painting in the classical convention and with regular assumptions it still leads to the conclusion: *a man was killed with a knife*. A part of the painting can be separated, so that its parts are not adjacent to each other. Triptychs and graphic stories are scattered meaningful objects. Usually a painting can be considered a two-dimensional continuum of points. But can a finite set of points of a painting be considered a painting? And is it true that whatever is semiotically given by a continuum of points, can also be given by a finite selection of these points? A positive answer to this question may be considered a hypothesis of pointilism.

(11) If $\alpha \in Iocn(\{\beta\} \cup A)$ and β is a meaningful object in a given convention, then there exists a finite γ being a part of β that γ is a meaningful object in this convention, and $\alpha \in Iocn(\{\gamma\} \cup A)$.

The pointilist hypothesis is a sentence, which can be treated as a sentence of psychology or philosophy of perception, or epistemology. But neither a point (in the geometrical sense) nor a finite set of points is perceived in isolation. I do not claim that a geometrical point is not perceivable at all. Indeed, we perceive the intersection of two lines. But this requires a context of the two lines. The pointilist hypothesis is false if a point is understood as a circle with a zero radius. But if a point is understood as a minimal meaningful object, i.e. a meaningful object of which no intrinsic part is a meaningful object itself, then the pointilist hypothesis may prove true. When we talk about minimal meaningful objects, it is just as if we were talking about words or morphemes. They are repeatable. And it does not matter, whether a word, picture or musical composition is treated as a physical phenomenon with certain time and space coordinates or whether it is treated in a more abstract way. Between some objects, there is a relation of repetition, and this is what determines whether they are meaningful objects. What is not repeatable, has no meaning. But a deeper analysis of repetition may lead to the conclusion that in a natural language only sentences and texts are repeatable in the proper sense, while words, morphemes, and maybe even phonemes are repeatable only in derivative sense. The repetition of a sentence is a particular case of the relation of consequence.

The compactness hypothesis says that a consequence of a picture is a consequence of a finite selection of meaningful objects that are elements of the picture.²¹ Before we can decide whether the hypothesis is true, we have to examine the basics of semiotics more deeply. And as regards the analysis of repetitions, it is important that not all characteristics of a picture are its semiotic properties. It is possible that Goodman is right to say that a picture is unrepeatable — with all its characteristics (Goodman 1968). But semiotically pictures are repeatable, and this means that there might exist another picture with the same consequences.²² Aesthetic properties and technical mastery of a painting or a building are not consequences, and those are only sentences, e.g. in English.²³

Semiotic meaning of a meaningful object depends on the set of assumed sentences and other jointly considered meaningful objects and consists in extending the field of conclusions from this set by adding the meaningful object.

$$(12) \text{ Semiotic meaning } (\alpha, A) = Iocn(\{\alpha\} \cup A) - Iocn(A).$$

Semiotic meaning of an object also depends on what type of meaningful object a is, i.e. to what convention it is applied, and on the content of set A of assumed sentences and other meaningful objects. It does not say in an inscription or utterance in what language we should read the inscription or listen to the utterance. We understand an utterance as an utterance in a given language, just as we guess in what convention or style a picture was created and we 'read' it in a relevant way. Reading a text with comprehension and understanding a painting takes place by drawing conclusions from the text or painting and from relevant assumptions. In an everyday conversation we assume some common knowledge. Assumptions in art stem from both the

²¹This is not rule (10). This is a theorem of the theory of meaningful objects that speaks about the division of meaningful objects into meaningful objects. The compactness hypothesis, which we are discussing now, concerns a collective set of meaningful objects and treats this set as a meaningful object.

²²The preciseness of repetition is gradable. If someone copies David's painting without his mastery, we will probably not be able to draw the same conclusions from the face of the corpse about what man he was and how he behaved in the face of death. An exact copy of *The Death of Marat* may include the same semiotic information as the original, without retaining all aesthetic properties. The utterance: 'This painting is beautiful' is not a conclusion from the painting. It is a metasentence.

²³The repeatability of a sentence is ensured in (3). It is more difficult to formulate a similar thought about meaningful objects. It would probably require introducing the concept of repetition as a new primary concept.

reality and the fantasy world. The image of Bacchus invokes Greek myths, which we use to draw conclusions from the painting. The semiotics according to which people look at a painting is changeable and depends on what they know and what other paintings they have seen and they remember. An important factor in thinking is the ability to change the arrangement of assumptions, to change the tale in which we incorporate a sentence or a painting.²⁴ In a conversation, we assume that all that has been said so far is true, has a connection with the sentence currently being uttered and is used in concluding from it, and therefore has the meaning of a sentence. Also the surroundings of a picture can influence its meaning. If a sentence is used twice in a conversation, the meaning of the second use is completely different than the first one. If the meaning, in accordance with (1), is only the new information that a sentence brings in, then no element of the meaning of the first use of a sentence is an element of the second use. Maybe the second use

²⁴A critical commentator of a work of art draws conclusions from the work and might do this differently than the author. He might draw different conclusions than those that the author was aware of, or draw further consequences. Therefore, there are various rightful interpretations of a work of art. Sometimes a critic has doubts whether what he is describing are not his own opinions, whether he is not presenting himself instead of the author. The same problem arises in areas other than art criticism. A historian of philosophy is also aware of that. Those who say that a critic always presents himself too are right because the probability of other conclusions than those which the author was more or less aware of is huge. Conclusions, however, are drawn not only from the text of a work but also from the adopted sentences. And many of those have not been incorporated in the text by the author, for example trivial and commonly accepted sentences. A historian of ideology often tries to choose not those sentences that were written in a given epoch but those that were not written by the authors of that time because they were obvious and commonly accepted. Drawing conclusions from a work and from commonly accepted sentences beside it is the right procedure for a critic, if only — and this is quite an important reservation — we can rightly say about the commonly accepted sentences, not those provided explicitly in the work, that the author may have considered them common knowledge of his times and circles, that they are not anachronisms. A critic reading an ancient work who uses contemporary knowledge, that is one who adds sentences used today to the text of the work and concludes from this set of sentences, is more daring — maybe even insolent — than a critic who tries to retain enthymemes in the character of the epoch. The first one I would call a modernising critic, the second one — a period critic. Both these ventures probably have the right to exist but should be carefully distinguished if we want to avoid clashes resulting from the fact that we do not know what we are doing. We can debate which of the two types of criticism is more appropriate for a given subject or task. The period critic can depart far from the text and see where the set of sentences together with the sentences assumed by the author but passed over in the text would lead him.

is pointless, unless it differs from the first one, for example by intonation. If the second use is admissible at all, its meaning should probably contain sentences with the meaning of the first use: that it is important, that it is indeed so or that is what was said. Let us imagine that two identical pictures (for example two prints of the same photograph) are hanging next to each other. We can force ourselves to look at each of them separately. However, together they influence each other and they mutually annihilate each other. The viewer will comment on the fact that they look the same. But this technique can be used on purpose in picture composition. Andy Warhol placed twenty pictures of Marylyn Monroe in the same painting and the viewer concludes that her appearance was intended for mass consumption.²⁵

A sentence, text or picture often allude to another meaningful object, just as a religious painting can allude to the *Gospels*, and Brahms' Violin Concerto in D major to the *csárdás*. Using the above terminology, we can define allusion:

(13) β alludes to γ because of A if and only if for some α it is true that $\alpha \in Iocn(\{\beta\} \cup \{\gamma\} \cup A)$ and neither $\alpha \in Iocn(\{\beta\} \cup A)$ nor $\alpha \in Iocn(\{\gamma\} \cup A)$.

Two objects in different texts allude to each other if there is a conclusion from these two objects taken together that is not a conclusion from each of them separately.²⁶ For example, *to buy or not to buy* has the allusive consequence: *Don't think about being, think about buying*. Thus we create a text, in which the first sentence is a sentence and the second is the alluding sentence. Therefore $\alpha \in Iocn(\{\beta\} \cup \{\gamma\} \cup A)$ in (13) can be replaced by $\alpha \in Iocn(\{\beta\gamma\} \cup A)$. But such a replacement is not appropriate when β and γ are in different conventions, in different means of communication, such as a painting and the *Gospels*, and we cannot create a text by concatenation of these two.²⁷ According to (13), if β alludes to γ , then also γ alludes to β .

²⁵This example was given to me by Sol Worth.

²⁶It is quite important that β and γ are in different texts, different works. A reference to a fragment of the same text usually has a different nature than an allusion and influences the grammatical structure. An anaphor is not an allusion. A reference is to something within the same work, while an allusion is to something in another one. It is also not an allusion but a factor of the structure of the painting that the outline of John's robe in the Domenico Veneziano's *St John in the Desert* (The National Gallery, Washington) is almost the same as the outline of the lake.

²⁷It should be added that a concatenation of sentences or longer texts, even if they are in the same convention, can cause a change in the structure of one of them, and the reasons mentioned in the previous footnote again speak against such a change.

This symmetrical understanding of allusion may be useful. The Renaissance painting *The Entombment of Christ* alludes to the *Gospels*, and the *Gospels* allude to the Renaissance *The Entombment of Christ*. The meaning of the text of the *Gospels* remains the same but the set of its allusions changes over time. Reading the *Gospels*, we recall Renaissance paintings.

The definition of allusion (13) encounters interesting difficulties. If β and γ are axioms in an independent axiomatic system, then there may exist conclusions from two axioms that are not conclusions from any of the axioms separately. We say in those cases that the system is indivisible. But then it would follow from (13) that each of the axioms alludes to the other one, which is counterintuitive. In order to eliminate these kinds of situations, it suffices to add a condition that β and γ are in different texts. A proof or an axiomatic system are typical texts. The fact that a proof is a text can be shown for example by inserting expressions such as *therefore*, *and*, *on the other hand*. Two axioms of an indivisible axiomatic system are fragments of one text. But if we require β and γ to be in different texts, the definition of allusion will be quite apt. But then we need a definition of a text or rules governing texts. It is extremely difficult to define the concept of text. Moreover, we do not know enough facts about texts. The grammar of texts, i.e. discourse analysis, is not a well-developed area. Let us return to David's painting. On the table next to the bathtub there is an engraving: *À MARAT, DAVID*. But we do not conclude from it that right after the murder of Marat and before his body was removed from the bathtub David carved this inscription on the table. This is not a usual signature. We think of it as an important part of the painting and we conclude from it. And still this part of the painting belongs to a different order, as if being in a different language or way of speaking. The realism of the painting does not require everything in it to be painted in the same convention. Here we have two conventions. The engraving is not real in one convention, and the scene of the death of Marat is not real in the other. Let us also observe that the engraving alludes to Roman inscriptions, namely by the form of letters. This, in turn, alludes to the fact that Roman civic virtues were admired during the French Revolution. As a result, the engraving is David's personal homage to

A change of places would make the relation of allusion asymmetrical, which would probably correspond to some intuitions related to this concept. But it is better to have a symmetrical concept first, and separately add which of the elements is older (this does not occur directly in works but instead is given from the outside, it is a historical metasentence) and this way obtain an asymmetrical concept of allusion which corresponds to these intuitions.

Marat (Wallis 1973).

The history of panting has taught us to operate with more than one key within one painting and to see the harmony of conventions: in Caravaggio's *Nativity* there is Mary and the Child, and Joseph, and an ox, and in addition St Francis and St Lawrence. There is also a flying angel. The painting does not assert that St Francis indeed was present during the birth of Christ although it asserts that the ox was present. We know that we should arrive at the conclusion that St Francis was there in a different, maybe spiritual sense. A similar mixture of conventions appears in all kinds of paintings in which next to the Nativity or Crucifixion scene there is the kneeling founder of the church. Again, we know that he was not actually present there. We learn to combine conventions of two orders, although each of them separately may be in the same convention as in Caravaggio's painting. We have to distinguish this kind of combination of two conventions from a joint representation of two systems of the assumed reality. And so in Perugino's *Pietà*, as in many paintings, the body of Christ has almost no weight. The body lies on the laps of the two Marys but their dresses are not ruffled. This way the artist says that the heavenly order of things differs from the earthly one. There are numerous Crucifixion scenes in which Christ's body does not hang on the cross but instead floats in the air. These paintings do not use two conventions. They speak about two worlds within the same convention. The consequence of Perugino's *Pietà* is that there are two types of reality and that the body of Christ is not fully subject to the laws of physics.

The concept of consequence, whether logical or semiotic, required theorems that would link them to important words of a language — in particular with logical connectives. Sentence (6) links the concept of consequence with negation. What can we say then about negation in general semiotics? There can be negative sentences among the consequences of a painting or a building. The following sentence can be a conclusion from Perugino's *Pietà*: *The body of Christ is not a purely physical object*. Analysing the relations between conclusions and various parts of a painting, and the way in which these parts make up a painting seems difficult without some intermediate instrument, without an overlaying structure. But overlaying a painting with linguistic structures is a dangerous venture, just as doing this with a building or even a poem. However, what sometimes follows from a painting are negative sentences or conjunctions and thus there is an indirect link between the painting and logical operators. Similarly, a Renaissance palace tells us that the owner is not afraid of an armed raid. A Roman palace

from those times makes a negative allusion to a castle. There are no bay windows supporting a gallery to be able to throw stones and pour hot tar. Many Florentine palaces, however, have mock bay windows and tiny galleries that make a positive allusion to military architecture. If a meaningful object makes a negative allusion to another meaningful object, we can assume that they are in a relationship of a certain kind of negation. But let us be careful with negation, both in English and in general semiotics. There are paintings that are contradictory under the usual assumptions, i.e. the set of their consequences is the set of all sentences. Sometimes the conclusion from a painting is a question. In *The Calling of St Matthew* by Caravaggio Christ and St. Peter approach a gamblers' table. The gamblers are not surprised to see biblical figures. One of them asks: 'Are you summoning my partner?'. Therefore a negation, a conjunction, or a question are sometimes conclusions from paintings.

There has long been an ongoing debate on what is more difficult: art or criticism. Montaigne wrote about poetry: 'il est plus aisé de la faire que la connaître'. Later, in the 18th century, the playwright Philippe Destouches was of an opposite mind: "La critique est aisé, l'art est difficile" (Tatarkiewicz 1962). It seems to me that the theory of art, and in particular the semiotics of art, is still at a nascent stage. I cannot say the same about art. Art is present in all cultures, while the theory of art only in some. Discussing art and customs is like discussing language: people speak in all cultures but only in some of them they write grammars. Therefore I agree with Montaigne.

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