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AN ANALYSIS OF INTERROGATIVES. PART 2 — THE STRUCTURE OF QUESTIONS.

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1. INTRODUCTION

The article "An Analysis of Interrogatives. Part 1 — The Problem of Primary Terms of the Logical Theory of Interrogatives" (Koj 1971) presented the conclusion that a system of erotetic logic needs to include unique, specific terms which cannot be reduced to terms known from other branches of logic. It did not specify how many specific terms should be included in such a framework or which non-specific terms ought to be chosen for it. Nor did the article discuss the syntax of erotetic logic. The mentioned issues must begin to be addressed — however, the present article shall not present definitive conclusions. The aim of this work is to accumulate material which, along with other information, may facilitate the choice of a logical system that will serve as the basis for erotetic logic and of the specific terms of a logic of questions.

The number of primary terms of erotetic logic and the simple syntactic structures in the system depends on the number of types of interrogatives. In order to determine the specific terms of our logical system we need to specify the most important types of questions and decide whether these types may be reduced to one another or to some common model. Only then will we be able to ascertain the number of primary terms. Each primary type of interrogative needs to be assigned at least one primary term.

The previous part of the analysis of interrogatives specified the criterion for discerning question types that differ in meaning, namely the fact that interrogatives with the same meaning may be used interchangeably.

Two interrogatives may be used interchangeably if not knowing the answer to one of them is tantamount to not knowing the answer to the other. The concept of 'the answer' has not yet been specified and for now we must rely on our colloquial and intuitive understanding of the term. The examples presented here for analysis shall not require a more specific definition of this concept. The criterion of interchangeability will continue to be used, since it is natural to assume that reconstructions of questions which differ in meaning will have a dissimilar syntactic structure. This allows the semantic elements of the interrogatives to come to light; and emphasising these elements belongs to the primary aims of all logical reconstructions of the structures of natural languages. In other words, the reconstructions of questions ought to include the equivalents of all semantic elements which lead to the diversity of interrogatives.

2. THE METHOD OF DETERMINING THE LOGICAL STRUCTURE OF EXPRESSIONS IN A NATURAL LANGUAGE

A. In very general terms, the logical structure of an expression may be defined as the syntactic elements that are common in many utterances with a similar meaning. Such a description is far from perfect, it would therefore be advisable to conduct further analysis of its elements. If we wish to determine the structure of a given expression, we usually take into account the form of many other utterances with a similar meaning and establish what structural aspects they have in common. This raises the question of how to define the mentioned similarity in meaning. Finding a solution to this problem proves difficult, if not impossible, yet the choice of examples for analysis is always based on some semantic similarity. This similarity then manifests itself in the fact that the chosen examples are interchangeable in a given number of situations or contexts without appearing nonsensical to skilled language users. Due to the already mentioned difficulties we shall not attempt to present a general definition of expressions which are semantically similar, but assume that interrogatives carry a similar meaning if, when asked in earnest, they fulfill the following three functions:

(a) they reveal the inquirer's lack of certain knowledge;

(b) they reveal the wish to acquire missing information;

(c) they reveal that the inquirer has some knowledge that facilitates the acquisition of missing information.

Many expressions fulfil all of these conditions, but let us assume that only those that have a specific syntactic structure may be considered questions. This assumption is important, as many utterances structured like declarative

sentences may fulfil the conditions specified in (a), (b) and (c). Such criteria for defining interrogatives are not superfluous, because syntactic structure alone is not enough to determine the subject of analysis. We need to isolate syntactically similar expressions and treat this likeness as the basis for specifying the syntactic similarities in the reconstructions, disregarding the grammatical differences resulting from the fact that our examples might come from different ethnic languages.

In view of the aforementioned criteria, the following utterances may be considered semantically similar questions:

(1) Who discovered America?

(2) When will you go to the cinema?

(3) Where did you lose your pen?

(4) What did you do?

These and other similar expressions shall be the subject of analysis in the present article. At this stage we need to start choosing examples for analysis. Each new paragraph shall present new examples based on the aforementioned criteria.

B. The aim of this section is to find paraphrases of the analysed expressions. Scholars usually focus not on the structure of the utterances under consideration, but on the form of their paraphrases. The reason behind this is, in fact, very simple. The questions:

(5) Czy jesteś głodny?

and

(6) Are you hungry?

are very similar in terms of their function. As we know, there are exact translations of one another. However, if we analyse (5) and (6) from the point of view of grammar, we may notice that each of them has a different syntactic structure. The logical structure of these two expressions ought to be the same, due to the fact that they have the same function; a logical syntactic structure ought to incorporate and emphasise only that which accentuates the syntactic elements of an utterance. Knowing that (5) and (6) are equivalents, we need to find paraphrases with identical structure. When considering interrogatives that differ in meaning, we ought to seek paraphrases that also differ, but are built from the same elements in corresponding positions. The words that appear in one paraphrase and not in the other are then treated as variables. By eliminating these words in both paraphrases and replacing them with variables of the same syntactic category allows us to determine that the two interrogatives, though not equivalent, have the same syntactic structure. We may assume that in some cases it is impossible to

find paraphrases with the same structure, i.e. that there are questions with dissimilar syntactic structures. We may also claim that all questions are built according to one and the same model. In other words — this issue is still open to discussion. Further research shall provide the material necessary for resolving this problem.

Paraphrases ought to be constructed using the languages of known logical systems. It may be argued that the expressions of such languages are better defined than their equivalents in any natural language. Applying logical terms to paraphrasing allows us to make our intuitive choices more specific, but may also lead to oversimplification (the languages of logic are usually less elaborate than natural languages). Such oversimplification can be avoided if one applies the conditions for creating an appropriate paraphrase specified in the first part of the present analysis (An Analysis of Interrogatives. Part 1). These conditions will still be used throughout this article.

C. The third phase of logical analysis involves determining the structure of the final paraphrases. The expressions which appear in all paraphrases of the semantically similar expressions under consideration are treated as constants (if we are to conduct further analysis, we will need to specify the meaning of this term — by means of a definition or axiom, or with the help of the principles applied). It has already been mentioned that the expressions that differ between paraphrases but belong to the same syntactic categories are substituted by the variables of the suitable syntactic categories. The resulting model derived from the examples reveal the logical structure of the analysed utterances.

D. Sometimes a single interrogative may be paraphrased in more than one way, and each of the suggested paraphrases fulfils the basic conditions of semantic fidelity (cf. An analysis of interrogatives. Part 1...). In such cases we need to decide which paraphrase — and consequently, which structure — works best. The choice needs to be based on the criterion of precision: the more exact the paraphrase, the better. This gauge for judgment is not entirely generalised and does not always lead to picking the most suitable substitute, but it is sufficient for our purposes. Despite its imperfections, the criterion has one advantage: the choice of paraphrase is not influenced by factors such as simplicity of the substitute or the possibility of translating it into less elaborate languages of logic.

However, our criterion of precision requires further specification. Paraphrase x is more exact than paraphrase y, if it presents a given expression which appears in the analysandum as semantically compound, while para-

phrase y presents the same expression as semantically simple. Expressions x and y, initially regarded as semantically simple, are in fact compound, if it is possible to find paraphrases x' and y' which do not include any extra-logical terms differentiating x' and y'. The only difference between paraphrases x' and y' is the order or iteration of the extra-logical terms, or the presence of dissimilar logical terms. In other words, if x and y are treated as simple expressions, it is easy to neglect the fact that some semantic elements appear both in x and y and that no element appears only in one of these paraphrases. This overlooked fact is revealed by paraphrases x' and y'.

Disassembling the expressions in more exact paraphrases allows us to notice similarities in utterances that seem to have nothing in common. What differentiates two exact paraphrases x' and y', are the expressions placed at the location of the variables. By constructing exact paraphrases we get the chance to include elements common for a larger number of expressions. In time, this may lead to the formulation of a more general theory.

3. THE STRUCTURE OF THE SIMPLEST PROBE QUESTIONS

A. Interrogatives may be divided into two large groups — those that may be answered by yes or no (the so-called 'closed questions') and those that begin with an interrogative pronoun (also referred to as 'probe questions'). The present section shall focus on determining the forms of the simplest probe questions:

(1) Who discovered America?

or, more precisely:

(1') Which of men discovered America?

Let us also use the following examples:

(2) Which Italian discovered America?

(2) Which of the Italians discovered America?

According to our criterion of interchangeability, (1) and (l') differ in meaning from (2) and (2'), because knowing the answer to (1) is not equivalent to knowing the answer to (2). A person asking question (2) in earnest must already know that America was discovered by some Italian. A person asking question (1) has no such information. Thus, the sentence: 'An Italian discovered America' may be considered an incomplete answer to (1), but is not a suitable reply to (2). Since (1) and (2) are not equivalent, this difference must be reflected in their syntactic structure. The reconstruction of both these interrogatives ought to imply the set in which the discoverer of America is to be found. In the case of question (1) it will be a set of people, in the case of (2) — only a set of Italians. Using variables appears a

convenient solution. The search for a good paraphrase also ought to take into consideration interrogatives (l') and (2'). Variables allow us to introduce the firstlings of logical terminology. Using them, we arrive at the following paraphrase for interrogatives (1) and (1'):

(3) Which x is such that x is a man and x is the discoverer of America?

Questions (2) and (2') may be presented as:

(4) Which x is such that x is an Italian and x is the discoverer of America?

Both (3) and (4) are longer than the original utterances, yet they have some advantages that shall now be discussed.

The structure of (3) and (4) resembles expressions which include quantifiers, e.g.:

(5) There exists an x for which x is an Italian and x is the discoverer of America.

This similarity suggests that the interrogative pronoun 'which' is in fact an operator. This analogy becomes even more pronounced if we consider that replacing the variables in (4) with specific values results in a nonsensical utterance:

(6) Which x is such that Columbus is an Italian and Columbus discovered America.

Our linguistic intuition suggest that (6) is to be treated as nonsensical. The situation is analogous in the case of many systems of predicate calculus. We may use this similarity to present the paraphrases in a shorter form. If the word 'which' is an operator, then it ought to be followed by the related variable. The scope of the operator should be presented in brackets. The term 'which' may be replaced with an abbreviation — e.g. a question mark. If we apply these principles to (3), (4) and (6), we arrive at the following structures:

(7) ?x (x is a man and x discovered America);

(8) ?x (x is an Italian and x discovered America).

The operator is to be read: 'which x is such that. . . '. The structure of (7) and (8) may be used as a model for other simple probe questions, provided that these interrogatives may be paraphrased in a similar way. Let us now consider other examples of such questions:

(9) Where are you?

(10) When will you go to the cinema?

(11) Where are you going?

(12) For whom are you doing this?

It appears that the following substitutes of interrogatives (9) to (12) may be considered paraphrases. These substitutes are interchangeable in

accordance with our criteria. The only difference is the style, which is of secondary concern to us.

(9') Which x is such that x is a place and you are in x?

An intermediary form between (9) and (9') would be: In which place are you? This expression also reveals the relation between the two interrogatives.

(10') Which x is such that x is a period of time and you will go to the cinema in x?

The intermediary form between (10) and (10') would be: In what time will you go to the cinema?

(11') Which x is such that x is a place and you are going to x?

In this case the intermediary form is: To which place are you going?

(12') Which x is such that x is a human and you are doing this for x?

These paraphrases are very similar. They all contain the expression 'which x is such that...' followed by a conjunction. Both elements of the conjunction contain the same variable that follows the operator. The difference between the presented paraphrases are not structural, but related to the dissimilarities in the substitution of default predicate variables appearing in the mentioned conjunctions. The structure apparent in interrogatives (3) to (12) may be considered as the model for simple probe questions. However, it must be added that this structure is not yet fully defined. We see now that the search for paraphrases had a purpose — it revealed the structural similarities between expressions (9) to (12), which was not apparent at first glance. This is the first step towards creating a uniform theory of interrogatives.

We now have some concept of a logical structure of simple probe questions. However, the justification for using this model and not some other seems rather weak, therefore it must be added that other suggestions (i.e. using modal sentences, imperatives and other types of utterances as paraphrases) have been analysed and rejected in the first part of this analysis. We should nevertheless regard the suggested model with some degree of scepticism. The arguments presented above are solid enough to make us consider the possible results of using this model in our further analysis.

B. For the sake of brevity let us now introduce some terminology related to interrogatives. The function within the range of the operator of the question shall be called the 'core' of the interrogative. The following section shall focus on determining the structure of this core. First, let us consider these two questions:

(13) Which boy was fighting yesterday?

(14) Which of the people fighting yesterday was a boy?

According to our criteria, these interrogatives may be paraphrased with the following:

(13') Which x is such that x is a boy and x was fighting yesterday?

(14') Which x is such that x was fighting yesterday and x is a boy?

Questions (13) and (14) are semantically different, as they cannot be used interchangeably. The latter of these interrogatives could be asked in earnest only if the group of fighting people included not only boys, but also girls. Question (14) will not be posed if only boys were fighting; in such a situation only (13) may be used appropriately. The only difference between the substitutes (13') and (14') is the order of the elements of the conjunctions that form their cores. Because the order of elements in a conjunction may be altered, substitutes (13') and (14') ought to be interchangeable. However, if they are to be paraphrases of interrogatives (13) and (14), they cannot be substituted one for the other. This means that their cores cannot be interchangeable and cannot be composed of simple conjunctions. The structure of simple probe questions is therefore more complex than it appears.

There are many methods of preserving the fixed order of the elements of the core. Each of them is closely related to the semantic characteristic of the expression used in a paraphrase. This issue lies beyond the scope of the present article. Let us only briefly consider the possible methods without analysing their advantages and disadvantages. First of all, we may treat the expression 'and' as a special type of conjunction, in which the order of elements may not be changed. We may also assume that the type of the interrogative operator used in the paraphrases makes it impossible to perform operations based only on equivalence or identity. The third option involves extracting the first element from the core and treating it as an integral part of the operator. This element cannot then be extracted from the operator and included into the core, as may be done with elements of bounded quantifiers. We may avoid making definitive decisions in this respect by placing the first part of the core in type brackets that does not appear anywhere else. They shall indicate that the order of the components cannot be changed and that paraphrases with a different arrangement of elements are not equivalent. The first component of the core shall be called the given of the interrogative; the second component will be referred to as the warp of the answer. The interrogatives (13') and (14') would then be presented as:

(14") ?x (|x is a boy| and x was fighting yesterday);

(14") ?x (|x was fighting yesterday| and x is a boy).

The conclusions presented in this paragraph may be summarized by the

following: interrogative pronouns have the nature of operators and the order of the components of the core is fixed.

4. RECONSTRUCTING PROBE QUESTIONS WITH QUANTIFICATION

Many interrogatives specify the number of items which are the subject of the question. Our previous examples did not indicate how many people discovered America or how many boys endeavoured to harm one another. We may assume that in both these cases there is one, or at least one person who fulfils these criteria. This quantification needs to be included in the reconstruction of interrogatives, because questions with a differing quantification may not be reducible to one another and have a dissimilar structure. This, in turn, would influence the number of primary terms of erotetic logic.

Let us consider the following examples:

(1) Which two were fighting?

(2) Which of you was screaming? (implied: at least one person was screaming)

(3) Who was fighting here? All must confess.

which may also be expressed in a stylistically cruder, but shorter form:

(3') Which all were fighting here?

(4) Who was fighting here? At least three must confess.

The appropriate interrogative in this case would take the following form:

(4') Which at least three were fighting here?

Similar questions may be constructed with the use of all possible types of quantification: at least one, exactly one, one at most, at least two, two at most etc. The aforementioned examples prove that interrogatives with quantification are indeed very numerous. If we assume that a system of erotetic logic may contain more questions than are used in real life (but not more types of questions), we arrive at the conclusion that this system would contain as many possible questions, as there are quantifiers. What is more, we may impose additional qualifications on the items we are asking about, e.g. to specify the number of elements in the set to which the item belongs. This process results in the creation of interrogatives such as the following:

(5) Which one of you three placed drawing pins on the chair?

(6) Which students one from each class will organize the school gala?

We may also ask about more than one type of item simultaneously:

(7) Which boys from which class smashed the lamps in the park?

This multitude of questions raises the question of whether all interrogatives may be reconstructed using a single type of question mark (i.e. one primary interrogative operator) or is it necessary to introduce more operators.

The most useful research in the field of probe questions with various quantifiers was conducted by Tadeusz Kubiński. It was he who discovered and utilised the analogy between interrogative pronouns and quantifiers.[1] He assumed that each quantifier corresponds to one interrogative operator. Quantifiers referring to numbers are all very similar and may be reduced to some models, and Kubiński concluded that operators may also be presented in a more schematic way. He also noticed one significant difference between quantifiers and operators. All of the former may be defined with the use of a general quantifier, negation and equivalence, yet Kubiński sees no such possibility in the case of interrogative operators. Consequently, he regards each operator to be a separate primary term. The relations between interrogatives with different operators are established e.g. by looking at the answers corresponding to each question. As before, we shall use several examples to ascertain whether operators may be reduced to one another.

Let us come back to question number (1). The aim of this interrogative is to find the two boys who were fighting. We know that x is a boy and that x belongs to a set of two. The warp of the answer is that x was fighting. The fact that there were two boys fighting may be expressed in several ways. In terms of restricted functional calculus with equivalence we may say that there are exactly two items that fulfil a given condition. Thus, the expression 'there are exactly two such items that...' may be treated as a so-called quantitative quantifier. On the basis of the analogy between operators and quantifiers Kubiński assumes that the expression 'which two...' may be paraphrased with the interrogative operator 'which exactly two x are such that...'. Similarly, the expressions 'which at least one...' and 'which all...' can be translated into the language of interrogative operators as 'which two exactly x...' and 'which all x...'. The solution suggested by Kubiński may be called 'the quantifier approach'. According to this approach, (1) can be paraphrased as the following:

(8) Which exactly two x are such that x is a boy and x was fighting.

The idea that two boys were involved in the fight may also be expressed

[1]Kubiński described this issue in his many publications, enumerated in the previous part of this analysis (Koj 1971). His final conclusions are presented in Kubiński's latest book, which I acquired having written most of the present article (therefore I only make partial use of it in the present work): Kubiński 1971.

in a different way. We may say that there exists a set of two elements which contains all and only those boys who were fighting. This method allows us to introduce the concept of a set, elements of a set and quantification of sets — giving us a far broader range of instruments of logic. This approach may be referred to as 'set-theoretic'. The details of the paraphrase of (1) are as follows. The interrogative operator becomes slightly different: 'which all x are such that...'. The given of the interrogative now includes the information that x belongs to a set of two elements and that x a boy. The warp of the answer contains only the fact that x was fighting. Thus, utterance (1) becomes:

(9) Which all x are such that (|x belongs to a set of two elements and x is a boy| and x was fighting).

The same paraphrase may be expressed in a less concise form using only symbols of set membership:

(10) ?x {| Σu [x ϵ u $\cdot$ Πzz' z" (z ϵ u $\cdot$ z' ϵ u $\cdot$ z" ϵ u $\rightarrow$ z' = zvz" = z)] $\cdot$ x ϵ a boy| $\cdot$ x was fighting}.

If we apply the concept of cardinality, (10) may be presented in the following way:

(11) ?x [| Σu/x ϵ u$\cdot$ u = 2 $\cdot$ x ϵ a boy)| $\cdot$ x was fighting].

Thus far we have no indication of which paraphrase is the better one. Both (8) and (11) appear equally suitable, therefore we need to ascertain whether one of the suggested methods may be better suited for our purposes.

According to the quantifier approach interrogative number (2) can be paraphrased as: (12) Which at least one x is such that x is one of you and x was screaming.

The interrogative operator in this paraphrase differs from the one used in (8).

The set-theoretic approach produces the following paraphrase:

(13) Which all x are such that x belongs to a set with a cardinality greater than 1 and x is one of you and x was screaming;

which can also be presented as:

(14) ?x [|Σu(x ϵ u $\cdot$ u $\geqslant$ 1 $\cdot$ x is one of you)| $\cdot$ x was screaming].

Similarly, within the framework of the quantifier approach (3) is paraphrased as:

(15) Which all x are such that x was here and x was fighting.

Again, the interrogative operator is different from the ones used before. The set-theoretic approach allows us to paraphrase sentence (3) as the following:

(16) Which all x are such that x was here and x was fighting

or

(17) ?x[|x was here| · x was fighting].

Paraphrases constructed in accordance with the set-theoretic model, in our case (11), (14) and (17), all employ one and the same interrogative operator: 'which all x are such that…' ('?x'). Interrogatives (4), (5), (6) and (7) may also be presented in this way. Their respective paraphrases are:

(18) ?x[|Σu(x ϵ u · u $\geqslant$ 3) · x was here | · x was fighting];

(19) ?x[|Σu(x ϵ u · u = 1) · x belongs to you three | · x put drawing pins on the chair];

(20) ?x?y[|Σu(x ϵ u · u $\geqslant$ 1) · Σu' (x ϵ u' · u' $\geqslant$ 1) · x is a class of students| · x smashed the lamps in the park].

The above examples provide sufficient evidence to the fact that the set-theoretical approach produces more precise paraphrases than the quantifier framework. The latter uses a number of non-interchangeable interrogatives operators, whereas the former only employs one. The set-theoretical approach allows us to reduce quantifiers relating to numbers. As a result, paraphrases of questions (1) to (7) do not include any extra-logical terms unique for erotetic logic. The quantitative approach viewed operators as primary and simple, yet the set-theoretic framework managed to present them as compound entities. In view of our criterion of precision, the set-theoretic approach seems to be better. The analysis of interrogatives simply forces us to employ a language more elaborate than the one constructed on the basis of restricted functional calculus. The richness of the language of set theory allows us to peer deeper into the semantic structure of interrogatives and gives us the possibility of creating similar paraphrases for other questions, which may set the foundations for a cohesive theory of interrogatives.

5. THE RECONSTRUCTION OF CLOSED QUESTIONS WITH NO QUANTIFICATION

Closed questions may roughly be defined as those that only have two possible answers — namely the confirmation or negation of the sentence explicitly or implicitly included in the interrogative. The manner of negating and including a sentence within an interrogative varies from one language to another. According to this imprecise definition, the following utterance may be considered a closed question:

(1) Did Columbus discover America?

This question is rather ambiguous. It has long been known that closed questions may express doubts regarding the subject, predicate or the copula (Maaß 1793: 160). We usually indicate what we are asking for by placing

the stress on the appropriate word. In many languages (e.g. in Polish) this does not lead to any changes in the sentence structure. We may differentiate between the various versions of interrogative (1) by writing the stressed words in capital letters:

(2) Did COLUMBUS discover America?

(3) Did Columbus discover AMERICA?

(4) Did Columbus DISCOVER America?

In the case of interrogative (2) the inquirer knows that America was discovered by somebody, but is not certain whether it was indeed Columbus. The inquirer asking question (3) knows that Columbus discovered something, yet is not sure if it was America. The inquirer in question (4), in turn, knows that Columbus had something to do with America, but does not know whether this was the discovery of the continent and not, for example, conquest or making the first charts thereof. Questions (2) to (4) do not comply with our criterion of interchangeability, as knowing the answer to one is not tantamount to knowing the answers to the others. In this case the difference lies in the negative answers. In other words, the negative answers to (2), e.g.:

(5) Some other person, and not Columbus, discovered America

is not equivalent to a negative answer to question (4), i.e.:

(6) Columbus discovered something else.

Naturally, both of these answers are false, yet the inquirer may not know that. We have already established that question (2) has only two possible answers:

Columbus discovered America.

Somebody else (some non-Columbus) discovered America.

The recipient of the question chooses the answer from among items that satisfy the condition 'x discovered America' from a set of two elements which includes Columbus and non-Columbus (the latter is an indefinite description). In this case, however, question (2) ought to be reconstructed using the model of probe questions described in the previous section of the present article. The paraphrase would then look as follows:

(7) ?x(|x ϵ {Columbus, non-Columbus}| $\cdot$ x discovered America).

Interrogative number (3) may also be presented in a similar way:

(8) ?x(| x ϵ {America, non-America}| $\cdot$ Columbus discovered x).

The rich language of logic is able to present each relation as a category, therefore question (4) may be reconstructed as:

(9) ?R[|R ϵ {discovered, not discovered}| $\cdot$ Columbus R America].

The same general model may be applied for paraphrasing alternative questions, e.g.:

(10) Was America discovered by Columbus, Vasco da Gama or Cook?

In this case the item satisfying the condition 'x discovered America' is chosen from a set of three elements containing Columbus, Vasco da Gama and Cook. Thus, the reconstruction of (10) is similar to the previous paraphrases:

(11) ?x(|x ϵ {Columbus, Vasco da Gama, Cook}| · x discovered America).

Analogous reconstructions may be made for interrogatives where it is the copula or the predicative expression that constitutes the object of doubt.

The presented arguments point to the fact that both closed questions and alternative questions are special cases of the model applied to paraphrase probe questions. Further examples will allow us to perform a deeper analysis of the possible implementation of the mentioned model.

6. CLOSED QUESTIONS WITH CONTESTED QUANTIFICATION

The previous section focused on interrogatives where the inquirer had no certainty as to the objects (in the broadest meaning of the term) associated with the subject, the copula or the predicate expression. Such doubts may arise in the case of questions containing sentences with a simple structure. We ought to turn to analysing interrogatives that contain more complex sentences. First, let us consider questions containing sentences with quantification, such as:

(1) Is EVERYBODY home?

(2) Are there AT MOST TWO PEOPLE such that they committed the burglary?

or shorter:

(2') Did AT MOST TWO PEOPLE commit the burglary?

(3) Are there EXACTLY ELEVEN people such that they comprise a football team?

in other words:

(3') Does EXACTLY ELEVEN people comprise a football team?

The contested element in these questions is the quantifier, which makes it difficult to use the previously described methods of paraphrasing. Let us examine the problem in detail.

Although we wish to paraphrase closed questions in a way that would not contradict the conclusions made in the previous part of the present analysis, we cannot escape the fact that interrogative particles may only be presented as some type of interrogative operator. To determine the most

suitable operator, we need to ascertain what variables it binds. Examples from the preceding sections of the present article included an interrogative operator that bound variables which were names (no distinction was made between proper names and class names). The items that constituted the objects of doubt belonged to the category of name variables. If we paraphrased interrogatives (1) to (3) using variables that belong to the same category as the objects of doubt, we would have to introduce quantifier variables. In the previous sections we created sets comprising the possible answers to the question. An analogous paraphrase of interrogatives (1) to (3) would have to include sets of special relations from the category of quantifier variables. If we assume that 'k' stands for quantifier variable, '{ —, —, . . . }' represents a set of relations designated by quantifiers and 'k. . . ' symbolises any sentence function with the quantifier variable k, we arrive at the following model:

(4) Which k is such that k is a quantifier relation belonging to the set { —, —, . . . } and k . . .

Questions (1) to (3) may also be understood — and consequently, paraphrased, in a slightly different way. Interrogatives such as (1) or (3) are answered by a confirmation or negation of the sentences included in them. It may therefore be assumed that it is not the quantifiers, but the functors of assertion or negation. If this is true, then the variable bound by the interrogative operator is the variable encompassing the two-element set of functors (or rather the relations assigned to them) composed of the functors of assertion and negation. If we present the functor variable encompassing the mentioned set as 'f', then interrogative (1) may be substituted with:

(5) Which f is such that: f (everyone is home).

Similar paraphrases may be constructed for (2) and (3):

(6) Which f is such that: f (at most two people committed the burglary);

(7) Which f is such that: f (exactly eleven people comprise a football team).

Finally, we may assume that the variable is actually a sentence. Then interrogative (1) would be the basis for choosing one of two possibilities: (a) Πx(fx) or (b) — Πx(fx) where fx is an abbreviation of the function is at home. We need to choose the q which is identical with (a) or with (b), and does correspond to the actual situation. Under these premises the substitute

of interrogative (1) takes the following form:

(8) Which q is such that q is identical with) Πx(fx) or q is identical with — Πx(fx) and q occurs.

A slightly different way to present it is:

(9) Which q is such that q belongs to the set {Πx(fx), — Πx(fx)} and q occurs.

It is easy to notice that the substitutes (8) and (9) are based on the set-theoretical model of paraphrasing probe questions. Equally apparent is the fact that both these paraphrases contain a number of terms with a somewhat unclear meaning. The precise definition of these terms, namely the concept of identity of events, their belonging to sets and occurring in reality, are serious and very well known logical problems. It seems that the present circumstances may force us to attempt to resolve them.

We have analysed three possible methods of paraphrasing questions (1) to (3). It seems impossible to find a paraphrase model in which the interrogative operator would bind the name variables, as it was the case with the set-theoretical method. Since there is no other paraphrasing model in sight, the next section shall focus on choosing the best of the presented options.

7. THE INTERROGATIVE OPERATOR IN RECONSTRUCTIONS OF CLOSED QUESTIONS WITH CONTESTED QUANTIFICATION

As in the previous sections, we shall attempt to determine which method of paraphrasing the analysed type of interrogative is better by looking at a number of examples. They will help us determine which paraphrasing model is more accurate, i.e. provides a homogeneous way for presenting the largest number of different interrogatives. To the examples analyses in the preceding section let us add one more:

1. Are there exactly two, three or four people in the house?

It is obvious that the paraphrases of question (1) cannot use an interrogative operator binding functor variables. A simple confirmation or negation of the sentence included in (1) is not a suitable answer to this interrogative. An operator binding name variables would be equally unsuitable. The choice in this question does not involve names, but quantitative quantifiers. If we assume that the interrogatives from the preceding paragraph ought to be paraphrased with the help of an interrogative operator binding functor variables, then a different type of interrogative operator is needed for

question (1). An interrogative operator that would be equally suitable for paraphrasing (1) and the examples from the previous section would allow us to create more precise substitutes — thus proving more suitable for our purposes.

If we employ an interrogative operator that binds quantifier variables, the paraphrase of question (1) will take the following form (disregarding all the reservations which may arise from the possibility of constructing a suitable logic):

(2) Which k is such that (|k ϵ {there exist exactly 2, there exist exactly 3, there exist exactly 4} and k people are in the house)?

We see that operators binding quantifier variables provide a unified method for paraphrasing examples from the preceding section and for question (1). They also allow us to present the interrogatives in a more precise way. They work better than operators binding functor variables. However, it is too early to assume such operators are the most suitable, because — as we shall soon demonstrate — the same properties can be found in operators binding sentence variables. Question (1) could also be paraphrased as:

1. Which q is such that (|q belongs to {there are 2 people in the house, there are 3 people in the house, there are 4 people in the house}| and q occurs).

As before, the evaluation of this method of paraphrasing shall not include any possible difficulties related to the construction of a suitable system of logic.

It appears that there are two equally acceptable (from the point of view of the analysed examples) methods of paraphrasing. In order to choose one of them, we will need to look at further examples. Let us start with the following situation: There is a student who needs to write down the law for the non-contradiction of sentences. This student knows the elements needed for this law, but is not certain of the order of the components in the conjunction, which is crucial for this law. He is not familiar with the law of interchangeability of conjunction. He simply does not know which of the situations truly occurs: ˜(p.˜p) or ˜(˜p.p). For this student, the problem lies not only in the order of expression, but also of the configuration of occurrences. It is justified for him to ask:

(4) Is it ˜ (p.˜p) or ˜ (˜p.p)?

This question cannot be presented with a paraphrase that contains an interrogative operator binding quantifier variables, because it does not include any quantifiers. Interrogative operators binding name variables are

equally unsuitable, since the utterance does not contain any names or name variables. Thus, we are left with only one possibility — a paraphrase that would include an operator binding sentence variables. A reconstruction of (4) would then look as follows:

(5) Which q is such that (|q belongs to {˜(p.˜p), ˜(˜(p.p)}| and q occurs).

The same operator may also be used in paraphrases of interrogatives (1) to (3) from the previous section, therefore we may assume that this method is the one providing the most accurate reconstructions of questions.

8. RECONSTRUCTION OF OPEN QUESTIONS

All previously analysed types of interrogatives determined the structure of the reply, indicated primarily by the warp of the answer. There is, however, a different group of interrogatives — the so-called open questions. This type may be deemed more important, as it is more frequently used in natural languages. Open questions begin with expressions such as 'why', 'how', 'for what purpose'. The structure of the answer is not determined by the question, or is only indirectly indicated — we know that it needs to specify the causes, means or aims. Let us use an example:

1. Why did John began to study mathematics?

This interrogative has many possible answers, e.g. John began to study mathematics, because it appealed to him; John began to study mathematics, because he was stubborn, and subjects always seemed difficult to him; John began to study mathematics, because his father told him to; etc. The only common aspect of these answers is the presence of the expression 'because' or its equivalents. The same is true in the case of the following question:

(2) Why did Peter buy the book?

He may have bought it in order to read it or to give it to someone as a present, or even to get the chance to talk to a nice shop assistant. The answers follow the term 'in order to' or its equivalents.

In both these examples the answers are linked with the sentence included in the interrogative by a certain type of relation. We may therefore assume that reconstructing open questions requires finding sentences that form a certain relation (in this case that of cause or result) with the expression already given. Strictly speaking, we need to find occurrences with a causal link to the given event. Such a representation of open questions may include the interrogative operator introduced in the preceding section:

(3) Which occurrence is such that it forms a causal relation with the occurrence: JOHN BEGAN TO STUDY MATHEMATICS?

Or, in a more concise form:

(4) Which p is such that p forms a causal relation with: JOHN BEGAN TO STUDY MATHEMATICS?

The above paraphrases confirm the legitimacy of the choice we made in the preceding section — the operator binding sentence variables seems equally suitable for these new types of interrogatives. If we could develop a logical terminology rich enough to encompass the concept of different categories of occurrences, we could ask about a single cause, two causes, at least three causes, at most three causes, etc. As before, we shall disregard all difficulties related to the construction of a suitable system of logic that would constitute the basis for the theory of interrogatives.

Tadeusz Kubiński (1971: 32-34) suggests a different method of paraphrasing. He simply reduces (1) and (2) to probe questions. Instead of (1) he introduces:

(5) Which is the reason for John's beginning to study mathematics?

This kind of question may be answered with:

(6) John's partiality to mathematics is the reason for John's beginning to study mathematics.

It is apparent that any paraphrase of question (5) ought to include an interrogative operator binding name variables.

Kubiński's framework is simple and steers clear of the logical difficulties which would have to be resolved if we decided to introduce operators binding name sentences into the paraphrases of open questions. Unfortunately, this method has other disadvantages. The transition from (1) to (5) — i.e. from John began to study mathematics to John's beginning to study mathematics — is based on a procedure that has not been researched thoroughly. We do not know whether it is always possible to make such a transformation and if not, what are the necessary conditions. Let us illustrate the potential problem with an example. A child is asking her father:

(7) Why is this sparrow grey?

The father replies:

(8) Because all sparrows are grey.

Such answers are rather common; explaining natural phenomena in terms of laws and theories represents this very type of reply. If we try to transform the interrogative in the manner suggested by Kubiński, we arrive at:

(9) What is the reason for the greyness of this sparrow?

The new version of the answer would then look as follows:

(10) Universality of greyness in sparrows.

Sentence (10) includes a name the construction of which would be difficult on the basis of known systems of logic.

These observations indicate that each of the presented methods of paraphrasing open questions has its strong and weak points. Both are fairly universal, i.e. may be applied to large groups of interrogatives. The choice of a more suitable framework will depend on the final decision regarding the basis for the logical theory of questions.

9. CONCLUSION

The analysis conducted over the course of the present article have proven that all types of questions may be paraphrased using two dissimilar interrogative operators: binding name or sentence variables. It also became apparent that the core of the question includes a symbol of a conjunction with a fixed order of elements. This and other facts allow us to conclude that a theory of interrogatives would have to be based on a system other than classic logic. Further analysis is needed to determine the nature of this logical system and its structure. It may be concluded that instead of bending the analysis to fit the existing set of logical tools, scholars ought to seek new methods and logical terms.

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Włodzimierz Ławniczak

ON SEMANTIC ASSUMPTIONS OF SYNTACTIC DESCRIPTION OF A WORK OF THE FINE ARTS

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1

The considerations included in this article aim to explicate certain scientific claims about works of the fine arts. However, the fulfilment of this task, as I understand it, imposes the need to consider the matter to what extent: (1) an analysis of a work of art may be conducted in appropriately generalized terms of logical syntax and semantics, (2) results of the analysis of this kind correspond to intuitions of arts researchers and their feelings about the importance of particular statements about the picture.

It is this matter that I will devote the most attention to here, while attempting to show that it is possible to employ notional apparatus of logic as an explicating means (as an explicating language — Giedymin, Kmita 1966: 114-115) of utterances of art historians and critics. The adequacy condition of such conceived explications is linking the "syntactic" description of a work of art, and thus the description of a painting itself, with certain semantic assumptions of the description, the assumptions defining subject references of particular fragments of the painting and properties of these fragments and their mutual relations — in the reality presented by the painting.

2

Assuming that at least the observable layer of a work of the fine arts is always a certain physical object, it seems that the work is obviously

subject to description, inter alia in terms of physics. However, at the same time it is obvious that not every description of this type is applied or relevant from the point of view of a historian or critic of the fine arts. The above claims may be illustrated with examples of such a description of fragments of a painting that is irrelevant from this point of view.

A convenient means to describe a painting seems to be the use of Cartesian coordinates. Let the bottom edge of Jacek Malczewski's *Autoportret z pisanką* (*Self-portrait with an Easter egg*) be the x axis of coordinate system, while its left edge — the y axis. Then, in the square with vertices determined by the coordinates (in centimeters) $A(33, 35)$, $B(35, 55)$, $C(35, 57)$ and $D(33, 57)$, the following fragments of colour surfaces may be distinguished: a) black, b) white, c) blue. All of the mentioned surfaces of the square have specific properties as, say, shape; also, there are different relations between them, e.g. an order relation denoted by the predicate "x is lighter than y" etc.

It is apparent that this randomly chosen square is not the fragment of the painting that might attract the attention of arts researchers, and consequently appear as an object of their description. In other words, the name referring to this square will not appear in the function of grammatical subject in a sentence (sentences) being a part of the painting's description relevant for an arts researcher. Reasons of this state of affairs shall be characterized in greater detail a bit later. Anyway, at present, it can be stated that the direct cause of the fact that the square, which is a fragment of the painting and is distinguished in the above indicated way, will not become an object (a reference to the term which is a grammatical subject of sentences) of such a description of the painting, which — from the point of view of an arts researcher — could deserve an interpretation, is: (1) the square's internal heterogeneity on account of colour, and simultaneously (2) the fact that each of its three constituent planes is only a fragment of a bigger, uniformly coloured whole. Thus it turns out that the subject terms of the sought description must be terms which are names of certain fragments of the painting's surface, which are uniform on a specific account. However, simultaneously, these fragments must not only be uniform on a particular account, but also must be such wholes that merging them with any other parts of the painting would deprive them of uniformity. Let's call wholes of this type — the MAXIMAL UNIFORM FRAGMENTS of a painting.

As it can be easily seen — the factor owing to which particular maximal uniform fragments of a painting are distinguished, is equality (on a certain account) between appropriate constituent elements of the fragments,

that is an equivalence relation in a set of sufficiently small pieces of the painting's surface. What should be customarily considered here is same-colourfulness (with a specific degree of precision which is established by the perceptual capability of the human eye) and e.g. same-saturation of colour, brightness, etc.

Let relation S be a specific equivalence relation (of the type relevant here) in the set of fragments, e.g. same-colourfulness. Further, let "x," "y," "z," "x_1," ... belong to a set of the painting's pieces. Now we can define a relation of direct coincidence between two pieces which are uniform on account of S, let's name it "KB_S," as follows:

$$\bigwedge_{x,y}(xKB,\ y\ \equiv xSy\ \wedge x \text{ directly coincides with } y).$$

Then, using the already defined term, we will define relation R

$$\bigwedge_{x,y}(xRy \equiv xKB_Sy\ \vee \bigvee_{z_1,\ldots,z_n}(z_iKB_Sz_{i+1}x = z_1 \wedge\ \ldots\ \wedge y = z_n)),$$

for every $i = 1$, ..., n-1.

R is obviously a transitive relation; each mereological whole created from elements of a class of abstraction of relation R (and only these elements), is a maximal uniform unit constituted by R.

Because different types of relations fall under the above characteristics of relation R (each of which corresponds to a different equivalence relation S): R_1, ..., R_k, the set of maximal uniform fragments may include elements which overlap or, even, such that the maximal uniform fragment on account of R_i will be composed of a few maximal uniform fragments on account of $R_j(i \neq j)$, or – on account of other mutual relations R_1, ..., R_m(where $i \neq 1$, ..., m).

In the course of this article, I shall call thus specified maximal uniform fragments of a painting – elementary units of a painting. Obviously, the set of elementary units of a painting U is identical with the set of mereological sums of classes of abstraction of relations R_1, ..., R_k. Let's add that each such subset of U to whom corresponds a family of classes of abstraction of whichever relation R_i, sums mereologically with the whole surface of the painting.

The physical description of the painting's surface – if the above terminological conventions are accepted – will be a description of relational system $P = <U; S_1, ..., S_m, T_1, ..., T_n>$, where U is a set of all elementary

units of a given painting, T_1, ..., T_n are many-element relations or one-element properties which belong to elements of U, and are different than any of S_1, ..., S_m; the latter are equivalence relations which determine particular relations R_i in the way generally described above: equivalence relation S_i determines relation KB_{Si}, while the latter determines relation R_i. Not all relations from S_i need to occur within S_1, ..., S_m, $m \leqslant k$, because some of them may turn out to be irrelevant for the painting's description (hence their role is limited exclusively to determining appropriate relation R_i).

The painting's description may operate and usually operates with properties which are – to put it extensionally – classes of abstractions from relations S_1, ..., S_m. These properties may be neglected in the characteristics of relational system P, because they are defined by these relations. For simplicity, however, let's assume that they will be present among relations T_1, ..., T_n.

3

Let's accept the assumption, intuitively totally justifiable, that universe U is finite, so is the number of relations S_i and also relations $T_j (j = 1, ..., n)$. Hence theoretically, it is possible to exhaustively describe the painting conceived as a relational system by operating only with atomic sentences.

Let language L_s be a semantically interpreted language whose vocabulary at least includes: (a) singular terms which are names of all elementary units of the painting, (b) predicates denoting one-, two- or more-element relations S_1, ..., S_m, T_1, ..., T_n, and also (c) logical constants of a narrower functional calculus. In the thus semantically interpreted language L_s it is possible to describe the structure of P (painting); the description will be a conjunction of atomic sentences of language $L_s$of the type $f(a)$, $g(a, b)$ or $h(a, b, c)$, where "a," "b" and "c" represent names of elementary units of the painting, "f" – a one-argument predicate which denotes a property occurring within T_1, ..., T_n, while "g" represents a two-argument predicate (in the case of "h" – a three-argument predicate) which denotes a relation S_1 or a relation occurring within T_1, ..., T_n. Let the construction of the description relevant here be as follows: we take into consideration the first predicate of language L_s, which denotes one of the positions of the characteristics of system P, and – in turn – either assert it or its negation about particular singular terms of language L_s (which denote elements of universe U), about particular ordered pairs or threes, etc. of these terms – depending on the number of arguments of a given predicate. Then, we

proceed analogously with the second predicate until the list is exhausted. Let's further assume that both – the set of singular terms of language L_s interpreted in P and the set of predicates of this language interpreted in P – are ordered. Consequently, among others, each elementary unit is assigned with a certain natural number (starting with 1) which at the same time is the index of an appropriate singular term. Let the mentioned singular terms in language $L_s$be of the shape "t_i" (where "i" represents a specific natural indicator).

Although singular terms of the characterized above description in language L_s are exclusively names of elementary units of the painting, it is possible to assume in advance that such a description is certainly "surplus," that is it contains sentences which describe states of affairs which are redundant from the point of view of a researcher who analyzes the painting as a work of art.

Let's assume that we have language L_s in which we describe the painting *Winter* by Bruegel and in which singular term "t_1" is the name of an elementary unit which has an ellipsoidal shape and represents the silhouette of a crow (I add this only to make the example more comprehensible), while term "t_2" is the name of an elementary unit which has a semicircular shape and presents the shape of a hunter's cap (compare the remark above); finally, let's assume that "t_3" is the name of an elementary unit which, as can be observed, has a lengthened shape and represents the silhouette of a tree branch. The description of this painting will contain, inter alia, a sentence of the type "t_2 is p centimeters below t_1," (where p ¿ 0) or the sentence: "t_3 is q centimeters below t_1," (where $p = 0$). The former of the described states of affairs is obviously irrelevant from the point of view of the analysis of the painting *Winter*. Although it cannot be said in general that the asserting predicates with two elementary units, directed distances with numerical values greater than zero are generally of no importance for this analysis, it is so in the particular case of elementary units t_1, t_2. Hence, it is clearly visible that by assuming a given property or relation of elementary units of a painting as relevant, we do not consider the fact that the property or relation is relevant on account of every elementary unit, or — respectively — on account of every ordered pair or three of these units; it is enough when there is at least one elementary unit or – respectively — a pair of elementary units or a three such that asserting the relevant property or relation about it is of importance for the arts researcher who analyses the painting.

However, the state of affairs characterized by the second example sentence seems to be of importance to a researcher who analyses the painting

Winter — for in this case the relevant numerical value is equal to zero ($q = 0$). Thus, as we can see, the relation denoted by the predicate "x is ... centimeters below y" may constitute in certain cases the state of affairs which is of importance for the analysis on account of the fact that the distance is equal to zero (as for t_1 and t_3), and not — to non-zero (as for t_1 and t_2). However, it is not possible to generalize this situation to any ordered pairs of elementary units of the painting *Winter*.

Let's assume however that the predicate in the description differs from the one considered above only in that it has no numerical indicator of distance. The state of affairs described by the atomic sentence "t_2 is below t_1" is now relevant for a certain type of analysis of Bruegel's painting, while the state of affairs described by the sentence "t_3 is below t_1" is rather irrelevant from the point of view of the mentioned analysis.

Thus, what we can say about the relation denoted by the currently relevant predicate is the same that we observed with reference to the two previously discussed relations (that are denoted by two different predicates) which fall under the common schema "x is ... centimeters below y:" it constitutes a relevant state of affairs with one pair of elementary units, while with another pair it does not. Thus in a painting's description relevant to an arts researcher, there should appear the predicate which denotes this relation, however the predicate should not refer (positively or negatively) to any pair of elementary units. The fact that one and the same predicate may be used in a description of a given painting in a relevant way in one case, while in another — not, will be explained soon. At present, basing even only on the discussed examples, it is possible to state that when only internal properties and relations between elements of a painting are considered, for any painting — it is not possible to establish in advance a full list of predicates for which there would be a guarantee that at least one occurrence of such predicates in the description would be relevant.

In the above examples, only the relations which occur between randomly chosen elementary units of the painting were discussed; the derived conclusions were also generalized to properties (one-element relations) of randomly chosen units of the painting. Here follows an appropriate example. While analyzing the painting *Basket of peaches* by Jean Chardin, it is possible to describe a certain fragment of this painting in the following way: t_1 is convex, where "t_1" is the name of an elementary unit which has an ellipsoidal shape and represents the silhouette of the upper edge of the glass (again I add this here only to make the example more comprehensible). The property denoted by the predicate "x is convex" is relevant from the point of view of

the analysis of Chardin's work. However, it is not relevant for the analysis of any work in which a swelling (on the surface of the canvas) was caused by a coincidental accumulation of colour pigment due to the glazing technique.

Let's consider now the question of what determines that certain properties and relations (of elementary units of a painting) are, and certain ones are not — relevant from the point of view of an arts researcher? The answer to this question arrives immediately when we consider the previously given examples from the point of view of the knowledge about what given fragments of the painting represent when the whole painting is taken into account. We asserted that the relation denoted by the predicate "x is q centimeters below y," used in the sentence "t_3 is q centimeters below t_1" (where $q = 0$) is relevant. We asserted this because we possess silently assumed knowledge about what is presented in the situation described in the sentence "t_3 is q centimeters below t_1." Namely, it presents the state of affairs which can be presented in the following description: *A crow sits on a tree branch.*

Thus, in order to have a guarantee that the properties and relations of elementary units taken into account in the painting's description are at least mentioned once in the description in a relevant way, or — generally — are relevant from the point of view of an arts researcher, and also that no property or relation of this type has been omitted — it is necessary to realize in advance what the painting presents, what is its semantic equivalent. Moreover, already when relations S_i which determine appropriate relations R_i, and hence – the set of elementary units – are chosen, it is necessary to take into account the semantic aspect of the painting; otherwise there is no guarantee that the distinguished elementary units are appropriate (relevant).

4

In order to express the semantic knowledge about the painting, i.e. the knowledge which provides indispensable assumptions to make the painting's description which would be relevant for an arts researcher, we shall use a generalized notion of rules of denotation. It will be a generalized notion because these rules must refer not to language expressions, as in the case of their usual, logical understanding, but – to artistic equivalents of these expressions. The rules will assign equivalents with property individuals or relations from the represented domain.

Obviously, first of all we shall establish syntactic categories of particular factors present in the painting, syntactic categories which are also in this case understood — needless to say — in a generalized way. With this

aim, we shall use language L_s. Namely, we move the syntactic category of a given expression of language L on the denotation of this expression in the painting. Hence:

(1) singular terms of a painting are the painting's elementary units (denotations of singular terms of language L_s);

(2) one- and more-argument predicates of a painting are properties and relations S_1, ..., S_m, T_1, ..., T_n;

(3) atomic sentences of a painting are the state of affairs which appear in the painting and which correspond to atomic sentences of language L_s– we shall call them ELEMENTARY STATES OF AFFAIRS;

(4) logical connectives of a painting are the logical relations which occur between the painting's states of affairs and which correspond to the connectives of: negation and conjunction of language L_s: (a) the logical relation of negation (that is the connective of the painting's negation) is one-element and restricted to a given state of affairs when the negation of an appropriate sentence of language L_s is true in the painting (that is when this state of affairs does not occur); (b) the logical relation of conjunction (that is the connective of the painting's conjunction) is two-element and restricted to two appropriate states of affairs when the conjunction of two appropriate sentences of language L_s is true (that is the two states of affairs occur simultaneously).

Having thus ordered syntactic categories with appropriate factors which occur in the painting we can at least say that the rules of denotation relevant here create a certain system (or rather — as will be shown soon — certain systems), within which: (a) singular terms of the painting are assigned with represented individuals, (b) predicates of the painting — with properties or relations of represented individuals. These two types of rules are sufficient in order for the represented elementary states of affairs to correspond to the painting's atomic sentences, i.e. the painting's elementary states of affairs. However, logical connectives, i.e. logical relations between the painting's states of affairs, have their standard semantic interpretation: in this case they are analogous logical relations of the represented states of affairs. Incidentally, it becomes clear now why certain properties or relations which occur in the painting are irrelevant: (1) in the context of the whole painting, or (2) locally. In the case of (1), pertinent factors that occur in the painting are not subject to rules of denotation, they do not comprise syntactic units (predicates), while in the case of (2), rules of denotation indeed take into account the factors, but the factors may occur locally in an irrelevant way, i.e. their local occurrence may be implied by the occurrence

of other relevant properties or relations – which are more basic and which imply a series of other properties or relations. Hence, on purely economic grounds, only the more basic properties or relations are taken into account.

What we shall call now the painting's syntactic description is the enumeration of all the painting's elementary states of affairs (atomic sentences) or their negations, assuming at the same time that states of affairs consist only of relevant elementary units, properties or relations, and no unit, property or relation of this type has been neglected.

Every elementary state of affairs, the atomic sentence of the painting, can be presented as an ordered pair $<A, B>$, where "A" represents a given elementary unit, or a pair or a three, etc. of such units, while "B" – a specific property or relation from the repertoire S_1, ..., S_m, T_1, ..., T_n. Since the objects enumerated here are denotations of appropriate expressions of language L_s, hence particular elementary states of affairs may be presented as substitutions of the following patterns:

(1) <den "t_i", den "P_j">,

(2) <<den "t_i", den "t_j">, den "P_k">,

(3) <<den "t_i", den "t_j", den "t_k">, den "P_l">, etc.

Obviously, "den..." represents the denotation of expression "..." — a singular term or a predicate of language L_s. Using the ordering of singular terms and predicates of language L_s, we can analogously order their denotations — singular terms and predicates of the painting. Let's remind ourselves that in a metalanguage appropriate to L_s, each of the painting's singular terms has a name of the shape "a_i," while the painting's predicate — a name of the shape "K_j," where $j = 1, ..., m, m + 1, ..., m + n$ (taking into account the fact that the painting's predicates constitute the repertoire S_1, ..., S_m, T_1, ..., T_n). Consequently, the painting's elementary states of affairs — its atomic sentences — shall be of the following shape:

(1) $<a_i, K_j>$,

(2) $<<a_i, a_j> K_k>$,

(3) $<<a_i, a_j, a_k> K_l>$, etc.

Obviously, each elementary state of affairs $<A, B>$ meets the condition: $A \in B$.

On the other hand, the state of affairs which is a negation of the elementary state of affairs $<A, B>$ shall have the shape: $<A, B'>$; obviously this state of affairs meets the condition: $A \notin B$ ("B" symbolizes B's complement). The logical relations of negation and conjunction may occur between non-elementary states of affairs (between a painting's non-atomic sentences); however, in practice, every description of a painting (or its fragment) may

be reduced to a (conjunctive) series of elementary states of affairs or their negations.

Within a painting's syntactic description, particular states of affairs may be enumerated in the order which takes into account: (1) indicators of elementary units (of singular terms) of a painting, and then (2) indicators of properties or relations (of predicates of a painting).

Thus, this description shall be e.g. of the shape: "the painting consists of the following atomic sentences or their negations: $<<a_1,\ a_2>,\ K_1>$, $<<a_1,\ a_2>\ K'_2>$, ..." (Of course, the example is fictional: in particular syntactic descriptions, the two exemplary states of affairs may not be present at all).

What is the subject of a syntactic description is a relational system, a structure

$$M_e = <U_e;\ N,\ C>,$$

where "U_e" represents a set of elementary states of affairs asserted or negated in the description, "N" – a one-element logical relation of negation, whereas "C" – a two-element logical relation of conjunction. It seems clear that when property N does not belong to any element of universe U_e (is empty in U_e), then relation C is connected in U_e. Further, I shall call the structure M_e – the ELEMENTARY REPRESENTING STRUCTURE of a given painting.

Let's point out that, although the description of an elementary representing structure of a given painting is syntactic in nature, it is in fact, on account of language L_s, semantic in nature: the description deals with syntactic units of a painting — particular atomic sentences or their negations which occur in the painting, however, simultaneously – with states of affairs built of objects which are denotations of appropriate expressions of language L_s.

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Let's ask a fundamental question now: how do semantic assumptions concerning a painting, and thus assumptions concerning rules of denotation for elementary units, properties or relations which occur in the painting, guarantee that we distinguish correct syntactic units of the painting, and thus — that we will really constitute the elementary representing structure of the painting?

In order to answer this question in as simple a manner as possible, we need to use another notion of a representing structure. What is meant here is a relational system generated so to speak by the elementary representing structure. The sense of what has just been stated will become clearer in a moment, when I outline the nature of this second representing structure, which I shall call — in contrast to the elementary structure — the NON-ELEMENTARY REPRESENTING STRUCTURE.

The universe of the non-elementary representing structure M_n are states of affairs which I shall call – in contrast to elementary states of affairs of the representing structure M_e – BASIC STATES OF AFFAIRS. The latter are ordered pairs $<A, B>$, such that:

(1) the first element of the pair, A, is always identical with a certain non-empty singular set or a singular relation of the type $\{<a_i, ..., a_j>\}$ $K_k \cap ... \cap K_j$, i.e. – with intersection of n-element relations – predicates x (K_k, ..., K_e) of the elementary representing structure whose field is limited to one and only one ordered n ($j - i = n$) of elementary units – singular terms of a given M_e (in particular, these relations may be one-element, hence n is one word);

(2) the second element of the pair, B, is always identical with the intersection of n-element relations – predicates of the elementary representing structure $K_r \cap ... \cap K_s$ (an analogous remark, made previously in connection to A, needs to be added here).

Thus characterized ordered pair $<A, B>$ is a basic state of affairs only on condition that $A \subset B$.

There are logical relations N, C — defined analogously as in the case of elementary states of affairs — between basic states of affairs; let's assume the following notation is for a basic state of affairs with the property N:

$<A, B'>$ (where "B" symbolizes B's complement)

Obviously, the logical relations of negation and conjunction may be expressed in a general manner — so that they apply to all states of affairs, not only the basic ones. However, similarly to the elementary representing structure — in practice, only negations and conjunctions of basic states of affairs, or their negations are relevant here.

What may be relevant apart from logical relations of basic states of affairs (or their negations) are certain non-logical relations which occur between these states. Every such relation V is connected with specific relations K_r ... K_s, which belong to K_l, ..., K_m, ..., K_{m+n}, in the following manner:

$$\left\langle \{\langle a_i, \ldots, a_k\rangle\}_{K_l \cap \ldots \cap K_m},\ K_p \cap \ldots \cap K_q \right\rangle$$

,

$$\left\langle \left\{\left\langle a_i', \ldots, a_k'\right\rangle\right\}_{K_l' \cap \ldots \cap K_m'},\ K_p' \cap \ldots \cap K_q' \right\rangle \in V \equiv$$

$$\equiv \left\langle a_i, \ldots, a_k, a_i', \ldots, a_k'\right\rangle \in K_r \cap \ldots \cap K_s$$

;

at the same time we assume for simplicity that both states of affairs between which relation V occurs, are basic (i.e. that none of them is a negation of a basic state of affairs). Shortly speaking, the relation V is an equivalent to the intersection of relations K_r, ..., K_s which occur simultaneously between elementary units a_i, ..., a_k, a_i', ..., a_k' — and which equivalent refers to these basic states of affairs (or their negations).

Thus, a non-elementary representing structure is the relational system:

$$M_n = <U_n;\ C,\ V_1,\ ...,\ V_p>,$$

where "U_n" represents the set of basic states of affairs or their negations, while "V_1, ..., V_p" represents the p number of non-logical relations between elements of U_n.

The need to introduce the notion of non-elementary representing structure will become more intuitive when I give examples of certain basic states of affairs or relations of the V type which occur between these states. Let's refer again to Bruegel's *Winter* and focus on the following sentence: "This stain which has a characteristic ellipsoidal shape is black". What corresponds to this sentence in the non-elementary representing structure of the painting *Winter* is the following state of affairs: the fact that this characteristically ellipsoidal stain is black. According to the terminological conventions adopted above it is the basic state of affairs $<A, B>$, in which A is a singular set whose one element is the elementary unit described as "this stain" – let's assign it to the symbol a_i, also, a_i has the property of having a characteristic ellipsoidal shape – let's assign this property (obviously understood extensionally) to the symbol K_j; whereas B is the property of being black K_k. Hence, our basic state of affairs is of the shape:

$$(1)\ \left\langle \{a_i\}_{K_j},\ K_k \right\rangle .$$

Another exemplary state of affairs consists in that there is a certain relation (of the V type) between two states of affairs; this state of affairs is characterized by the following sentence: "This bright smudge is lengthened and branched; it sticks closely to the dark smudge which is also lengthened and branched." Let's introduce appropriate symbols: "a_i," "a_j," "K_e" (bright), "K_l" (lengthened), "K_m" (branched), "K_n" (dark); now we can say that the state of affairs relevant here consists in the occurrence of the relation of close sticking (it is a relation of the V type) between the following two basic states of affairs:

$$\left\langle \{a_i\}_{K_e},\ K_l \cap K_m \right\rangle ,\ \left\langle \{a_j\}_{K_n},\ K_l \cap K_m \right\rangle$$

If we assign the relation relevant here to the symbol V, and simultaneously adopt that the notation for non-basic states of affairs is analogous to the basic states of affairs, it shall result in this case in:

$$(2)\ \left\langle \left\{ \left\langle \{a_i\}_{K_k},\ K_l \cap K_m \right\rangle ,\ \left\langle \{a_j\}_{K_n},\ K_l \cap K_m \right\rangle \right\} ,\ V_r \right\rangle .$$

What corresponds to such states of affairs in the non-elementary representing structure are analogously constructed represented states of affairs. And hence, for example, what corresponds to state of affairs (1) is the following represented state of affairs: the fact that this crow is black; whereas what corresponds to state of affairs (2) is the following represented state of affairs: the fact that snow – by sticking closely to the branch – covered a certain lengthened, branched shape which is formed by this branch.

As can be easily noticed, represented states of affairs are constructed analogously to representing states of affairs which correspond to them, however what may correspond to the intersection of properties or relations from a non-elementary representing structure are simple properties or represented relations. Hence, as a result, the set of represented states of affairs also forms a relational system which is formally analogous to non-elementary representing structure. This type of relational system shall be called REPRESENTED STRUCTURE. As can be seen there is analogy between states of affairs of representing structure and states of affairs of represented structure.

I shall not characterize here the notion of analogy which was lengthily discussed in the article *Znak – symbol – alegoria* (Kmita, Ławniczak 1970: 97f, see also Ławniczak 1971). Here I shall refer this notion only to the two-element relation between representing states of affairs, on the one hand, and represented states of affair, on the other:

$$<A_1,\ B_1>,\ <A_2,\ \mathrm{B}_2>.$$

The state of affairs $<A_1,\ B_1>$ is analogous to the state of affairs $<A_2,\ \mathrm{B}_2>$ on account of *tertium comparationis* $<A,\ \mathrm{B}>$, which meets the condition $A \subset B$ when $A_1 \subset A$, $A_2 \subset A$, $B_1 \subset B$, $B_2 \subset B$. For example, the state of affairs which occurs in the non-elementary representing structure: the fact that this characteristic ellipsoidal stain is black, is analogous to the state of affairs which occurs in the represented structure: the fact that this crow is black. Both of these states of affairs are analogous on account of the state of affairs which is *tertium comparationis*, and which corresponds to the sentence: "crows are always black," and on account of the fact that the given ellipsoidal stain and the represented crow have a common property which is characteristic of all concrete crows, while the blackness of the ellipsoidal stain has a property which it shares with the blackness of the represented silhouette of a crow, i.e. what this property is, is simply blackness. Similarly, bigger fragments of non-elementary representing structure and fragments of represented structure are mutually analogous. Hence, as can be seen, the set of analogies between states of affairs of non-elementary representing structure and states of affairs of represented structure is established by a certain system of knowledge W, on account of which:

(1) there occur inclusions of the type $A \subset B$, i.e. states of affairs which are *tertia comparationis* of particular analogies,

(2) there occur inclusions of the type $A_1 \subset A$, $B_1 \subset B$, within which particular properties or relations, in particular singular properties or relations, are "included" in appropriate properties and relations which are involved in appropriate *tertia comparationis*,

(3) there occur inclusions of the type $A_2 \subset A$, $B_2 \subset B$, within which particular properties or relations, in particular singular properties or relations, are "included" in appropriate properties and relations which are involved in appropriate *tertia comparationis*.

It is easily noticeable that knowledge of the type (1) is particularly relevant, not only because it is always generalized knowledge (either existentially or universally; here it was represented by the sentence "Silhouettes of crows are always black"), but also because it decides about the way in which the representing structure will be formed.

There are two different components of the system of knowledge W: (a) related to competence and (b) related to the subject. Component (a) refers to the reality outside the painting and is represented by knowledge of the type (1), component (b) is conventional in nature, i.e. it is a set of

specific cultural conventions and occurs mostly within knowledge of the type (2) and (3) (conventions concerning the method of representation with the aid of specific representing means). What needs to be added here is that neither knowledge of the type (1) is entirely related to the subject, nor knowledge of the type (2) and (3) — entirely conventional; let's notice that the assertion "all crows are black" mentioned here as an example, is to a great extent conventional in nature (crows are in general painted black, although, on the other hand, it is known that the appropriate assertion is not true).

When the above system of knowledge W is given, what is also given simultaneously is: the non-elementary representing structure, which is generated — as already known — by a specific elementary representing structure, and the represented structure. Thus by the same token, what is given is a specific system of rules of denotation which assign particular syntactic units of an elementary representing structure with their subject references within the represented structure. Thus in the system of knowledge W there are all semantic premises for constituting both elementary and non-elementary representing structures, and thus – for the syntactic description of a painting, and, in general, any work of art.

Obviously, knowledge W needs to be selected thus that the states of affairs constituted by this knowledge which occur in the representing structure could be asserted as a result of a simple empirical observation. However, if it were the only condition that knowledge W should fulfill, then its selection would be extremely arbitrary. However, it is not like that, since this knowledge must be a reconstruction of the system of beliefs of a historically given author of a work of art, or a reconstruction of the system of beliefs of an addressee of the painting – who spontaneously identifies with the author, i.e. who spontaneously projects their own beliefs on the author. Obviously, in scientific research devoted to art it is a historically given author who is relevant.

The historical restrictions on the selection of systems of knowledge W by no means eliminate the possibility to apply a series of alternative systems of this kind; each of them may be adjusted to what is known about the author's beliefs from historical sources, and simultaneously – to the entirety of our observations with reference to the painting. Hence, in general, we deal with a whole class of systems of rules of denotation, from which each corresponds to a specific system of knowledge W. As I have already mentioned, each system of rules of denotation distinguishes relevant elementary units, their properties and relations, and hence is a starting point for constructing an

appropriate representing structure (elementary or non-elementary), however – in general – it is not like that if two different systems of knowledge W_1 and W_2 determine two different systems of rules of denotation S_1 and S_2, then what will correspond to these two systems will always be two different representing structures. It is not like that simply because systems of knowledge W_1 and W_2 may differ only on account of inclusions of the type $A_2 \subset A$, $B_2 \subset B$, whereas they may be completely indifferent to the two remaining types of inclusion. In such a case, systems of rules of denotation will also be different, but differences will lie only in that the same syntactic units of the representing structure will be assigned to different subject references, i.e. – we will deal with two different represented structures, which will, however, correspond to the same representing structure. Hence the conclusion arises that it is possible to constitute a series of different representing structures on the basis of a given painting, however the number of these structures needs not necessarily be identical with the number of various acceptable systems of knowledge W, and hence with the number of different acceptable systems of rules of denotation.

6

Finally — according to the initial promise — I shall explicate (in a simplified way — because of the article's limited space) certain typical statements of researchers which concern particular works of the art of painting. For example, here follows a characteristics of Józef Pankiewicz's *Portret kobiety* (*Portrait of a woman*). "Only the face and neck of the model were painted using the technique of pointillism; a part of the hair and the background are closer to impressionist paintings in texture and colour. The matter looks dry and rough; the colour is intense, although more subdued when compared to Pankiewicz's impressionist paintings. The face was indeed modeled more traditionally, and is composed wholly of tiny — yellow, red, light green and orange — points; the nose was painted with a straight smudge of light green. The model's matted hair lying on the shoulders was painted with quite broad smudges of light and dark green and the rust color, with white and yellowish light. The background is light blue, with the shade of lilac on the right; the shadow behind the head is emerald, the shadows on the face are grey-blueish" (Szczepińska 1966: 187-188).

And here follows another example of Emile Bernard's *Breton Women in a Green Pasture*: "The canvas has three storeys: at the bottom we can see two big female heads with Breton caps on, which cover one-third of the canvas. They are cut by the painting's frame at the height of neck.

Almost at the same height, but on the left side, without any concern about proportions, there is a whole figure sitting back. In the center there are two female figures standing just above the heads with caps on, without any intention to compose these figures into the background, and silhouettes of children which together create the second storey of the composition. And finally, the third, the highest level — which is both the painting's horizon and a decorative frieze which consists of seven rhythmically arranged human figures. All what is material was pressed, mashed and reduced to flatness; the depth was gained not due to principles of perspective, but by placing next to each other big, enormous figures which are visible only to their shoulders, and completely small figures — as small as the caps of women in the foreground" (Jaworska 1966: 241-242).

At first sight, both quotations seem to be internally contradictory. Even if we disregard the assumption I silently adopted that the notion of the represented structure or any other represented object is theoretical in nature: it refers to certain non-observable objects, then, taking into consideration the whole diversity of notional apparatus used by historians of art, the notions referring to a painting or its components constantly exclude extensionally the notions concerning the represented structure or its components. This view will be shared even by an advocate of psychologism who treats the represented structure and its elements as mental images of the addressee or the author, which are given directly in introspection. Also, an advocate of psychologism shall consider the statements: "the face and neck [...] were painted using the technique of pointillism," "The face [...] is composed wholly of tiny — yellow, red, light green and orange — points," "two big female heads [...] are cut by the painting's frame," etc. — as internally contradictory, if they were to be understood literally. For a mental image of a female head cannot be painted using the technique of pointillism; analogous remarks also apply to other unquoted statements.

Let's notice, however, that an advocate of psychologism could regard as valid the statements of the type: "[...] we can see two big female heads" in a broadened sense of the word "see." However, in the point of view adopted here such statements can also be understood only metaphorically (Kmita 1967). For there is no doubt that both characteristics quoted above refer to certain fragments of representing structures: the painting by Józef Pankiewicz and Emile Bernard, respectively. What should be understood literally here are only such expressions as: "painted using the technique of pointillism...," "[...] is composed wholly of tiny [...] points," "[...] was painted with quite broad smudges of light and dark green...," and "The canvas has

three storeys: at the bottom we can see [...]" etc. Whereas expressions which refer to the represented structure of these paintings, such as: "the face and neck of the model," "a part of the hair," etc. – need to be understood as substitutive metaphors. Thus the alleged contradiction can be easily removed, as can be seen, when expressions which denote fragments of the represented structure are explicated as names of elementary units. In order to achieve this (to obtain a sentence which is a fragment of the syntactic description of Pankiewicz's painting) it is enough to replace e.g. terms: "the face," "the nose" in the sentence: "The face was indeed modeled more traditionally, and is composed wholly of tiny – yellow, red, light green and orange – points; the nose was painted with a straight smudge of light green" with appropriate terms which denote elementary units.

It needs to be highlighted that if the quoted authors use terms which concern the represented structure — and treat them literally — in their characteristics of particular state of affairs (sentences) of the representing structure, then the authors do so not because they do not distinguish between the representing and the represented structures, but because of the lack of appropriate syntactic expressions — the names of elementary units — in the dictionary of the language of the history of art. The mere fact of metaphorical use of exactly these terms in the role of non-existing names of elementary units additionally confirms that the fundamental thesis of the present considerations is right: particular fragments of a painting form elementary units of the representing structure which are relevant for a researcher of art only on account of the fact that they denote particular individual represented objects. Thus the description of the representing structure, a syntactic description of a work of the fine arts, is logically preceded by particular semantic assumptions, which are in the form of systems of rules of denotation and determine subject references of elementary units, their properties and relations, hence deciding in this way what should be the object of such a description in the first place.

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Jerzy Kmita

SOME OBSERVATIONS ON IDEALISATION IN THE LOGICAL INVESTIGATION OF THE LANGUAGE OF SCIENCE

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This essay is intended to review the following two issues: (1) Does the application of idealising concepts in the logical investigation of the language of science put it in essential contrast to the investigation popularly described as historical? (2) Is it possible to find some tacitly acknowledged rule that limits the freedom of using idealising concepts within the area of investigation in question? It must be added that both these issues, and especially the latter, are quite essential with regard to some ongoing debates in the framework of methodology or philosophy of empirical sciences; however, I have no intention of joining in those debates here, because what I have in mind is mainly to discover some additional elements that characterise an investigative action which I call the humanistic interpretation, especially in reference to cases when this interpretation is applied to language statements. In my book *Z metodologicznych problemów interpretacji humanistycznej*, wishing to avoid an excessive build-up of differentiations applied therein, I have decided to entirely forgo this additional characterisation. Yet, in my opinion, this characterisation is quite important to the issue of the legitimacy of interpretation as an investigative action; hence I see the following observations as an indispensable, if only fragmentary, complement to my above-mentioned book.

A. A LOGICAL INVESTIGATION VERSUS A HISTORICAL INVESTIGATION

1.

The article *The Paradox of Meaning Variance* by J. Giedymin contains the following statement:

The problem whether or not there may be scientific theories which are logically incommensurable with respect to their empirical content and the problem whether or not, as a matter of fact, certain 'prima facie conflicting' theories, such as Newtonian and relativistic mechanics are so incommensurable, are by no means as new as might appear from recent books, articles and notes concerned with them [. . .] [as they were reviewed by the neo-Positivists already in the 1930s — J.K.]. A confrontation of the discussion of the problem of comparability of theories thirty-five years ago with its treatment in recent contributions reveals at least the following difference: the older approach was logically far more refined and sophisticated, whereas recent contributions are much richer in historical detail. However, it is clear that the problem of comparability of theories, i.e. the first of the two problems formulated above, is a logical, semantical and not a historical, sociological or psychological problem. If so, no amount of examples or case studies will be sufficient to provide its solution. The second problem of comparability of two specific theories is historical only in the sense that it is a question about two actual, historically given theories. It is not a problem of "historic facts" for which a unique solution might be elicited from historical documents, i.e. relevant texts, by carefully studying them. (Giedymin 1970: 257)

This is because, Giedymin explains, terms used in the formulation of this problem are, for instance, "the language of the theory," "the meaning of the term" or "the change of meaning," which are analytical tools of logic, philosophy of science or the interpretative theory of the development of science.

Let us have a closer look at the contrast: logic vs. history (as a discipline of science) delineated in the above statement, overlooking the less strongly highlighted opposition: logic vs. psychology or sociology. The essential difference is supposed to lie in the fact that a historian finds particular "historical facts" in the source texts, which a logician does not do, because his task is only to construct "analytical tools;" these are the relevant semantic and syntactic terms referring to formalized languages, which are not used in actual reality, or to theories formulated in those languages. Also, as it can be inferred on the basis of the subsequent parts of Giedymin's text, a logician extracts the consequences from postulates which implicitly construct those concepts.

It must be said that, regardless of how he conceives "historical fact," J. Giedymin articulates a fairly widespread opinion, especially when it comes to the character of historical knowledge. He certainly does not share with Lévi-Strauss the opinion that those "historical facts" are somehow conveyed directly to the researcher studying the relevant source texts; but he would probably accept, together with Lévi-Strauss and many other scholars whose methodological reflection concerns the humanities, that such disciplines as history (and, according to Lévi-Strauss, also ethnography) "aim at gathering data," while such disciplines as logic (according to Lévi-Strauss: ethnology, which, in fact, encompasses logic as well; 1966: 102—108) "deal with models constructed from these data" (Lévi-Strauss 1963: 285).

In any case, it seems certain that the concepts which J. Giedymin calls the "analytical tools" of logic, and perhaps also the intervening concepts in the "models" of C. Lévi-Strauss (e.g. the meanings of terms "structure," "structural opposition," "inter-structural homology") fulfill the following conditions:

(1) From the point of view of current empirical knowledge, no real objects or real phenomena are included in their range.

(2) The difference between the designates of these concepts and the relevant real objects or real phenomena is, in essence, a matter of degree; the language of the given science, especially the language of the given scientific theory, is understood by logic in such a way that no real discipline or real theory operates on the language in this understanding; concurrently, however, if that empirically given language were codified, by means of appropriate rules, to a greater (in practice — unattainable) degree, it would be precisely the thing that logic speaks of.

The term 'idealizing concept' in the broader meaning, or briefly, IDEALIZING CONCEPT will henceforward be applied to the meaning of a predicate $f(x)$ which is characterized by the following:

(a) considering the given empirical knowledge, it denotes an empty set;

(b) the denotation of predicate $f(x)$ is the extreme "left-side" or "right-side" element of a systematizing series; the set of elements of this series is ordered by the following precedence relation: element Y is preceded by element X if and only if a certain fixed partial order R, defined on the sum of elements of the series, occurs between elements X and elements Y;

(c) at least some of the "intervening" elements of our series are — in the light of the relevant empirical knowledge — non-empty sets.

It is easy to notice that, to be precise, the term 'idealizing concept' should be applied with relativization to the given knowledge W, and also

to the fixed partial order R. I shall, however, omit these relativizations for the sake of conciseness. It must also be added that an idealizing concept is not necessarily the meaning of a single-argument predicate; a suitable generalization of the above definition which would encompass n-argument predicates is easy to formulate. In addition, let us note that the set of elements of the given systematizing series can be defined by means of any partial order R, as long as the indistinguishability relation with regard to R is transitive; in this case, the set of the systematization element is just a family of classes of the abstraction of that indistinguishability relation.

Further on, I shall make the distinction between the idealizing concept (in the broader meaning) and a certain special case of it, i.e. the effective idealizing concept, which could, alternatively, be called a "legitimate" (in one meaning of this term) idealizing concept; this will be discussed below. At this point, the following definition will suffice.

Predicate $g(x)$ expresses (as understood by Frege) a CONCEPT CONCRETIZED with regard to the idealizing concept expressed by predicate $f(x)$, if predicate $g(x)$ denotes a certain non-empty (in the light of the relevant empirical knowledge) element of the relevant systematizing series, whose extreme element is denoted by $f(x)$.

In fact, the stance — represented by, among others, J. Giedymin — regarding the difference which is of interest to us here, i.e. the difference between the logical investigation of a language, especially the language of science, and historical research, seems to be explained by the following thesis.

Thesis A. Within the framework of the logical investigation of the language (of science), concepts referring to language are of an idealizing nature, whereas in the historical investigation idealizing concepts do not occur; what does occur there is, at most, concretized concepts.

In the following continuation of the first part of my considerations I shall attempt to prove that thesis A is, in fact, false.

2.

Investigating the methodological features of historical investigation which are of interest to us here, we shall consider only the analysis of source statements. This is because they are an area of history whose subject is the closest to the logical investigation of the language of science. This limitation, however, does not mean that I am of the opinion that the view, which I am presenting here, in opposition to thesis A — i.e., that idealizing concepts do, in fact, occur in the historical investigation — refers exclusively to the

historical analysis of texts and sources; on the contrary, I refer it to other areas of history as well.

The aim of the analysis of source statements undertaken by a historian is entirely obvious; it is (1) to recognize states of affairs communicated by these statements; (2) to determine whether those states of affairs can be considered real and actual.

Let us, then, consider what authorizes a historian to say that a certain sentence, or a set of sentences, in a source text communicates a given state of affairs (a broadly understood one, i.e. including a problem or values). By way of example: what has authorized Tadeusz Wojciechowski to state that the sentence: "Non debuit christianus in christianum peccatum quodlibet corporaliter vindicare" (Wojciechowski 1925: 218), which is found in the chronicle of the so-called Gallus Anonymus, communicates that an anointed man ought not to inflict a corporeal punishment on another anointed man?

First of all, let us note that the assertion that the given source statement communicates a certain state of affairs is, of course, a hypothesis, which is confirmed by, among others, the presence of given linguistic features in this statement. Undoubtedly, the issue important to a historian is not what the statement he is investigating might communicate in general, but, principally, what its author intended to communicate. For instance, T. Wojciechowski translates the word 'christianus' not as the seemingly obvious 'Christian', but as 'an anointed man' precisely because he is of the opinion that the author of the chronicle wished to speak about anointed men, not about Christians in general. The hypothesis in question should thus be formulated as a sentence of the "The author's aim is to communicate that..." type.

If our hypothesis were to be confirmed by the features of the statement occurring in the text, it would, of course, have to be provided with a series of additional premises, so that sentences describing the features of that statement would arise from the hypothesis and the premises. Considering that historians never mention explicitly all the additional premises that might come into play, the methodological problem of how those premises should be detailed is rather difficult to solve. I shall not develop the arguments in favor of the solution which I am going to present below, since I discuss them in enough detail in my other works.[1] It suffices to say that variants opposed to the one assumed by me either refer to fictitious psychological quasi-laws, which in psychology are never formulated explicitly or often never

[1]Chiefly in the book *Z metodologicznych problemów interpretacji humanistycznej* (Kmita 1971).

formulated on its ground at all (the psychologistic solution), or exclude the option of a discursive reconstruction of the additional premises we seek (the anti-naturalistic solution).

In order for the hypothesis to be confirmed by sentences describing the features of the statement, in every case the following must be appended to the hypothesis:

(1) a declaration that ascribing said features to the statement was, in the light of the author's knowledge W, one of the alternative procedures the author has considered;

(2) a declaration that, in the light of knowledge W, those procedures are coupled with specific results, ordered according to a specific preference relation R, which is determined by consciously accepted norms; the result preferred relative to R is precisely the (communicative) aim defined in the hypothesis (hence, the hypothesis is a factor in this second premise);

(3) a general assumption of rationality, stating that the subject, recognizing n alternative solutions which are capable of being undertaken, have results delineated by his knowledge and are ordered according to preference relation, always settles on the procedure leading to the preferred result.

This preferred result, i.e. the aim of ascribing such-and-such language features to the statement in question, with be described as, briefly, the communicative SENSE (of the procedure of formulating such-and-such statement or such-and-such features as the result of that statement). In addition, it must be emphasized here, at a juncture of essential importance from the point of view of the issue I wish to discuss in the second part of the current essay, that premises (1) to (3) do not in themselves amount to a complete logical justification of the sentences describing the definite, actually observed features of the statement.

At this point, it is easy to notice that in ascribing to our historically given author of a source text an awareness, the result of which is the knowledge W and its specific norms — which we do in premises (1) to (3) — we actually idealize him; the concept of an individual consciously accepting even one set of sentences with all its consequences, i.e. a certain deductive system and, in addition, an appropriate set of norms, is obviously an idealizing concept.

I think, therefore, that it is needless to demonstrate in more detail that the assumption of premise (1), and above all premise (2), about a concrete author of a historical source is an idealization. Additionally, let us consider that the knowledge W must encompass, in particular, a complete set of language rules, both lexical and grammatical, as well as a certain system

of convictions concerning the extra-lingual reality, e.g. the communicated state of affairs and the recipients of the statement. This is because the fact which language features shall be ascribed to a given statement depends not only on its author's knowledge of the language (which knowledge is expressed in appropriate rules), but also on what state of affairs is to be communicated (choice of words with appropriate denotations) and on what the author of the statement assumes as to the knowledge (including the linguistic knowledge, of the expected recipients of the communication. The very act of ascribing the knowledge of language, even with respect to syntax alone, to a historical author is an act of idealization — an act of placing him in the position of an ideal "speaker-listener" as assumed by N. Chomsky (Chomsky 1965: 3).

3.

It might seem that crediting a historian with using such far-reaching idealizations is in itself a too-far-reaching idealization. However, as I shall attempt to demonstrate further on, the issue of whether or not a given idealization "goes too far" (i.e. whether the ideal type denoted by the stated idealizing concept differs in a greater or lesser degree from the real object in question) is not, in itself, very important to the assessment of the cognitive quality of the given idealization. In addition, it is worth noticing that the degree to which the above assumptions, by which the hypothesis regarding the statement's communicative sense is verified, are actually externalized in a historian's considerations, depends largely on the, metaphorically speaking, space-time distance and, above all, on the cultural distance that separates the researcher from the author of the source statement. As a rule, the more alien and "exotic" the author's cultural circle to the researcher, the less enthymematic is the process of verifying the hypothesis which defines the communicative sense of his text. This can be easily found out by comparing the historians' often extremely complicated deliberations on the subject of ancient or medieval written sources with the usually entirely intuitive manner in which contemporary source texts are used.

The act of posing a hypothesis defining the communicative sense of the text is, at the same time, the act of posing a hypothesis explaining linguistic features of the text. The type of explanation with which we are dealing with here I call the humanistic interpretation.

Essentially, the humanistic interpretation is represented by two variants. The first variant, which I will henceforward call the IDEALIZING

humanistic INTERPRETATION,[2] is characterized by an explanans which falls under the appropriate generalization of a scheme of premises (1) to (3) presented above. In this generalization, point (3) (an assumption of rationality) remains unchanged, whereas schemata of premises (1) and (2) have a more universal character: they represent concrete premises referring to any rational action (undertaken in a manner defined by the assumption of rationality) and not, as in the scheme given, only a specific case of a rational action, i.e. the formulation of a given statement. The second variant of the humanistic interpretation will be discussed in the second part of the current essay; it will turn out then that, as I have already indicated, the context in which the hypothesis regarding the communicative sense of the statement is verified significantly exceeds the framework of premises (1) to (3). For the time being, let us assume that the segment of that context which corresponds to that scheme will be called the idealizing context for the hypothesis specifying the communicative sense of a statement.

In humanistic research (hence also in historical research), the explanans of the idealizing humanistic interpretation, and thus, in particular, the idealizing context for the hypothesis specifying the communicative sense of a statement, is very often essentially linked with some systems of convictions characteristic to humanistic sciences. The knowledge and norms of the subject of a rational action, referred to in the framework of explanans, are usually derived from those systems. These systems of convictions are of very diverse types. They are, for example, the set of views distinctive to a Renaissance man; the set of views characteristic of a Symbolist poet; the system of convictions typical of a Baroque painter; the set of convictions motivating a capitalist's industrial activity in accordance with Marx; the knowledge of language expressed in a system of grammatical rules consciously used by N. Chomsky's ideal "speaker-listener;" the knowledge of scientific cognitive actions recreated by the methodology of sciences; the knowledge of language reconstructed by the so-called formal logic, etc. In short, all those systems — from those which are formulated loosely, in an almost literary manner, to those which are formulated carefully and exactly by means of a systematically applied conceptual apparatus of formal sciences — describe the "contents" of the awareness of various ideal types: a type of an ideal Renaissance man, an ideal Symbolist poet, an ideal Baroque painter, an ideal capitalist, "speaker-listener," scientific researcher and so on. I label such systems of convictions, regardless of whether they are for-

[2]Kmita 1971 discusses exclusively the idealizing interpretation (concretized only in an approximate manner).

mulated by statements, by directives or purely normatively, as THEORIES SYSTEMATIZING THE INTERPREATION. This term has its intuitive validation: owing to the existence of such theories, idealizations implemented by a humanist in the framework of the idealizing interpretation — especially idealizations implemented by a historian while posing hypotheses specifying the communicative sense of source statements — are always uniform for specific classes of concrete cases; they are not constructed from scratch time and again, in an entirely individual manner.

If, therefore, it is true that verifying the hypothesis which specifies the communicative sense of a historical source always presupposes a more or less conscious application of the idealizing context of this hypothesis derived from appropriate theories systematizing the interpretations, then this fact alone (overlooking other cases when a historian applies the idealizing humanistic interpretations) establishes the falsity of thesis A, according to which a historian — in contrast to a logician — does not use idealizing concepts. In the passage from J. Giedymin's article quoted at the beginning of this essay it is stated that both the general problem: whether empirical scientific theories are "incommensurable with respect to their empirical content," and the more detailed problem: whether two historically given theories of that type, for instance the Newtonian and relativistic mechanics, are incommensurable in this manner, are, logical, not historical, in their nature, because they cannot be resolved on the basis of even the most complete set of historical source data. This alleged impossibility is supposed to result from the fact that these problems are formulated by means of concepts which are "analytical tools" of logic and thus do not have any real subject reference — in short, by means of concepts which, as we have already established, are of an idealizing character. Yet, if the observations I have made so far are accurate, no historical problems exist at all, at least not in the meaning used by J. Giedymin; a historian analyzing source statements cannot avoid problems which are, allegedly, specific to logic. This problem belongs to two variants distinguished by J. Giedymin; the first variant consists of all general issues whose solution can be derived from this or that theory systematizing the interpretation (in this case: the written sources), whereas the second variant consists of more detailed issues, referring to concrete sources and their concrete authors and, in order to solve them, requiring the application of the idealizing humanistic interpretation.

Even the most cursory observation of a logician and a historian doing their research work will, of course, reveal that the logician, in contrast to the historian, focuses the lion's share of his effort on constructing theories

systematizing interpretations. Owing to that effort, the logician has far more clear and more precise idealizing concepts at his disposal than the historian; yet his preponderance in this respect is paid for with some losses. These losses will be discussed in the second part of this essay; and, incidentally, they are certainly not unavoidable.

B. AN EFFECTIVE IDEALIZATION

1.

The construction of the laws of idealization and idealizing concepts is by no means exclusive to humanistic research; this procedure is just as prevalent in natural sciences, especially in physics. What is more, it seems certain that the application of this procedure by Galileo, and then by Newton, laid the foundation for the modern investigation of nature; in particular, it enabled the widespread use of the cognitive apparatus of mathematics in this area of knowledge.[3]

The typical form of natural-science laws of idealization, and in practice the majority of theoretical laws of natural sciences, can be expressed, with some simplification, by the following formula:

$$\bigwedge_x [F(x) = d \rightarrow \ G(x) = H(x)],$$

where $F(x) = d$ is a specific idealizing condition: no real object has the property of quantity (value F) in the maximum or minimum degree d, whereas $G(x)$ represents the numerical measure of value G inherent to object x, which is equal to the numerical measure of value H (for x) provided that object x fulfills the relevant idealizing condition. The above formula is simplified, among other reasons because, in reality, natural-science laws of idealization operate on a much larger number of idealizing conditions in the antecedent and, in addition, the antecedent may also contain non-idealizing conditions.

In empirical observations, the objects given are always objects for which the function $F(x)$ assumes values other than d. For instance, Boyle's Law, which refers to the so-called ideal gas, contains in its antecedent idealizing conditions which assumes that the dimensions of molecules in the portion of gas x equal zero, and in addition that no forces of attraction act

[3]This is based on, among others, the results of methodological research conducted chiefly by L. Nowak (1971), as well as J. Such.

between the molecules of gas x (i.e. that those forces equal zero). Of course, the numerical measures for the respective two values in actual, existing gases do not equal zero. Let us, therefore, assume that the value of function $F(x)$ for a specific, empirically given object y equals k ($F(y) = k$), where $k \neq d$. In this case, the equation $G(x) = H(x)$ (which states, for instance, that the numerical measure of volume equals the inverted numerical measure of pressure) is no longer valid. What is valid instead is a certain transformed form of this equation, defined by (a) the absolute magnitude of the difference between the absolute magnitudes d and k, $|\ |d| - |k|\ |$, (b) the general principle of coordination,[4] according to which if $F(y) = k$, then $G(y) = \Phi(|\ |d| - |k|\ |, H(x))$, where $H(x)$ represents the numerical measure of value H for the case where x is an ideal type fulfilling the condition $F(x) = d$, whereas Φ represents a specific mathematical operation on $H(x)$ and on $|\ |d| - |k|\ |$. For instance, wishing to apply Boyle's equation to a given actual gas, we must introduce to it certain corrections resulting from taking the real dimensions of the molecules, and the forces of attraction between them, into consideration.

The procedure outlined above, which permits us not only to apply the law of idealization to forecasting and explaining physical phenomena (e.g. phenomena of the $G(y) = l$ type, where "y" represents any empirically given object) but also, in conjunction with the relevant principles of coordination, to verify that law, will be labelled, following L. Nowak, the CONCRETIZATION of a law of idealization. It must be added that this concretization may still proceed in a different way; it may, for example, not refer to the given principle of coordination at all, but only to estimate — on the basis of, for instance, the appropriate laws of statistics — the maximum declination of the value of function $G(x)$ for the given object y such that $F(y) \neq d$ (then we clarify whether we are forecasting an empirical fact of the $l \leqslant G(y) \leqslant m$ type). In any case, however, concretization always relies on the derivation, from the law of idealization $\bigwedge_x[f(x) \rightarrow g(x)]$ (and, optionally, the applied principles of coordination), of test implications "$f'(a) \rightarrow g'(a)$," such that the predicate $f'(x)$ expresses a concept concretized in the light of $f(x)$ and the predicate $g'(x)$ expresses a concept concretized in the light of $g(x)$ in the meaning assumed by me in the first part of this essay.

We will say that an idealizing concept expressed by the predicate $f(x)$ is an *effective idealizing concept* if (a) there exists a law of idealization

[4]This term, introduced by L. Nowak (1971), seems to me more apt than the phrase "principle of applying the idealisation rule" which I had used earlier (1971).

in which this predicate is either an antecedent (alternatively, a conjunctive element of the antecedent) or a consequent, and (b) in test implications derivable from that law by means of concretization occurs, respectively, the predicate $f'(x)$ expressing a concept concretized in the light of $f(x)$.

In accordance with the above terminological contract, the term 'effective idealization' will be applied to the act of making a statement regarding a given real object of the effective idealizing concept. It is easy to notice that the issue of whether the given idealization is effective (i.e. whether it leads to specific observation results and thus whether it is useful in empirical research) has nothing to do with the issue of whether the given idealization is "going too far" or not. A Newtonian object on which no forces are acting or an ideal gas hardly resemble their existing counterparts, and yet they constitute denotations of effective idealizing concepts.

2.

It is very surprising indeed that logicians, who in their research on language apply various idealizing concepts to such a very great extent, and who for that reason distance themselves (wrongly, as I hope I have demonstrated) from the historians, almost never consider the issue of whether they are not too free in constructing those concepts — whether they are not breaking by this some rules implicitly complied with in all sciences which use idealizing concepts. In my opinion, one of those rules is the directive that only effective idealizing concepts should be used. The fact that this rule is obeyed in natural sciences, which operate on principles of concretization which are easy to recreate, is beyond doubt. That it is in force in humanistic sciences as well is more difficult to demonstrate.

Considering that the assumption of rationality is a fundamental law of idealization specific to humanistic sciences, the obvious conclusion is that the concretization procedure revealing the effectiveness of particular humanistic idealizing concepts should in every case refer to this particular assumption. This would mean that a humanist proceeds in more or less the following way. (1) Dealing with a concrete, empirically given subject X of an action C, he idealizes his knowledge and norm, stating about him some specific idealizing initial conditions which fall under the antecedent of the assumption of rationality; (2) From these, on the basis of the principle of rationality, he derives a thesis referring to X undertaking the action C. Together, points (1) and (2) comprise the procedure which is here labeled the idealizing humanistic interpretation. It is, however, clear that the action C', possibly observed, and in any case actually preformed by X, may sometimes

be radically different from its ideal type, i.e. the performed action C (in order to underline the difference more clearly, I shall speak of the intended action C). Hence, it is necessary to (3) explain the performing of action C', taking under consideration the fact that it was intended as action C in the light of such knowledge and norms as, in reality, X was not characterized by. The difference between the previously (and idealizingly) assumed ideal state of X's knowledge and norms and the actual state of affairs ought to explain the difference between the intended action C and the preformed action C'.

This approach — in its vestigial, enthymematic form — may indeed be observed when we analyze some scholarly works in the field of the humanities, especially those of a historical nature. Yet much more often evident is a different approach, which can be presented so generally that the first approach, presented above, is its particular case. Let me first present an example from a logical (methodological) study, which — parenthetically speaking — shows that also logicians, not stopping at constructing theories systematizing the interpretations, occasionally apply the concretization procedure, even though they do it far, far more rarely than historians. The example is as follows. C. G. Hempel performs an idealizing interpretation of the fact that L. Gumplowicz has formulated the assertion: "[. . .] every social growth, every social entity, serves a definite end, however much its worth and morality can be questioned. For the universal law of adaptation signifies simply that no expenditure of effort, no change of condition, is purposeless on any domain of phenomena" as an action whose sense (from Gumplowicz's point of view) is to communicate an "empirical law" that admits to having no exceptions (Hempel 1959: 300-301). In Hempel's opinion, however, the action performed in reality is not identical with the intended action, i.e. it does not lead to that law being communicated, because Gumplowicz's awareness of the conditions that such a law should fulfill is inadequate. "There is a strong suggestion here that the alleged law enables us to understand social dynamics in close analogy to purposive behavior aimed at the achievement of some end," concludes Hempel. "Yet that law is completely devoid of empirical meaning, since no empirical interpretation has been given to [key terms — J.K.]. The 'law' asserts nothing whatsoever, therefore, and cannot possibly explain any social (or other) phenomena" (Hempel 1959: 300-301).

The conclusion from the above example is that a difference between the preformed action C' and the intended action C may also result from inadequacy in the knowledge possessed by the subject of the action, and not necessarily from any intrinsic "flaws" in that knowledge. Yet the inadequacy (or the degree of inadequacy) of the subject's knowledge cannot possibly

be taken under consideration in the framework of the concretization of the assumption of rationality, for the very simple reason that the antecedent of this assumption does not contain a condition concerning the adequacy of knowledge. We must, therefore, assume that what is concretized in humanistic research is not the assumption of rationality itself, but a certain other, general conditional, which may be viewed as a logical consequence of: (a) the assumption of rationality, (b) the assertion, which I will call the condition of effectiveness, that if the knowledge spoken of in the antecedent of the assumption of rationality is adequate, then the performed action is identical to the intended action. The logical consequence of the assumptions (a) and (b) which is of interest to us here will be called the ASSUMPTION OF EFFECTIVENESS. This assumption is a follows: if subject X, recognizing n alternative solutions which are capable of being undertaken, is possessed with the knowledge W ascribing to those actions m results that are ordered — according to X's norms — according to the preference relation R, and the knowledge W is adequate, then X will perform action C' identically with the intended action C which (from the point of W) leads to the preferred result. (Incidentally: the above assumption of effectiveness must not be confused with the requirement of effectiveness, which refers to idealizing concepts.)

Of course, the assumption of rationality and the assumption of effectiveness are formulated as separate in order to demonstrate the following state of affairs: in humanistic research, two issues are explained as parallel: (a) the fact of undertaking a certain (intended) action; (b) the fact of performing the action corresponding to the former. In the case of the former, the question to which the answer is sought is: "Why was such-and-such an action undertaken?;" in the case of the latter, this question is: "Why was such-and-such an action performed?" In the case of the former, only the assumption of rationality is involved, because the mere undertaking of the intended action is only influenced directly by the available knowledge (which is, subjectively of course, considered to be adequate), whereas in the latter case the assumption of effectiveness is involved, because the character of the performed action depends as much on subjective as on objective circumstances (e.g. the adequacy of subjective knowledge). Of course, the performed action is directly explained not by the assumption of effectiveness itself, but by its concretized form, which constitutes a conditional whose antecedent contains: (a) a characterization of the actual knowledge of the subject of the performed action, formulated in terms of its divergence from the ideal knowledge; (b) an analogously formulated characterization of the actual order of preference; (c) a characterization of the type of inadequacy

of the knowledge possessed by the subject of the performed action. The consequent of this conditional, in turn, contains a characterization of the performed action, formulated in terms of its divergence from the ideal intended action. This concretized form of the assumption of effectiveness arises from this assumption and from the relevant principles of coordination, just as in the case of natural-science laws of idealization.

As it has already been said, an explanation based directly on the concretized form of the assumption of effectiveness will henceforward be called the CONCRETIZED humanistic INTERPRETATION. It is easy to see that whereas the concept of the subject of an action undergoing an idealizing humanistic interpretation is in itself idealizing, the concept of the subject of an action undergoing a concretized humanistic interpretation constitutes the concretization of the former. The relation between the concept of an undertaken intended action and the concept of a performed action is analogous.

3.

The set of assumptions and terminological resolutions outlined above constitutes just a first step on the path to obtaining a satisfactory answer to the question of which of the idealizations applied in humanistic research, and especially in the logical investigation of the language of science, may be described as effective, i.e. which of them have corresponding concretizations appearing in the concretized form of the assumption of effectiveness. Undoubtedly, the difficulty which is the most difficult to overcome is the elusiveness of the principles of coordination, which are assumed in humanistic sciences, including the logical investigation of language. In contrast to the idealizing investigation in the field of natural sciences, humanistic research of this kind is conducted far more intuitively and, as a result, the search for the most relevant, even the most typical kinds of principles of coordination is not likely to lead to serious results any time soon.[5] This, of course, does not mean that such a search should be abandoned, on the contrary — for this very reason any success, even a partial one, is of vast importance to the methodology of humanistic sciences.

[5]Of course, it would even now be possible to distinguish some schemata of the humanistic principles of coordination which are possible to construct. I am of the opinion, however, that these schemata will acquire an argumentative value only when, as a result of an entire series of analyses of concrete texts, it will become possible to ascribe to them appropriately typical and yet more diversified examples .

Yet even at the present moment, when not much is known about the principles of coordination which would permit us to make a fully legitimized passage from the assumption of effectiveness to its concretized from, it is possible (assuming that my above observations are correct) to say a thing or two about the two kinds of dangers that await the logical investigation of language as a special case of the idealizing humanistic investigation.

The first danger is linked with an aspect which, in fact, constitutes a great advantage of logical investigations. It is well known that in the second half of the 19^{th} century, and especially in the first half of the 20^{th} century, this research area underwent a process of mathematization. It turned out that language may be described as a mathematical construct that can be characterized in terms of algebra, set theory or topology; in this approach, the set of expressions constitutes the domain universe, in which syntactic operations delineated by the formulation rules or inferential rules have, respectively, the character of algebraic, set-theoretic or topological operations. The semantic investigation of language, instituted by Alfred Tarski, was also mathematized. It is impossible to overvalue that vast progress that happened in logic under the influence of its mathematization — a progress which not only broadened our knowledge of language (or, more precisely, about its ideal type); not only inspired similar research in linguistics — to recall, for instance, the conceptions of N. Chomsky; not only essentially helped to advance the fundamentals of cybernetics, which is today such an influential and cognitively important branch of science — but also facilitated many achievements of a more practical, technical nature. Yet the many cognitive triumphs and practical feats of the investigation of language from the point of view of formal logic often breed a fascination with this precise research technique in itself, whose application then becomes an end, not a means to an end; investigations conducted in this spirit refer to language very little or not at all. I do not mean to criticize the fact that logicians, abandoning their native discipline, often become specialists in related, usually contiguous, fields of knowledge; this is, in fact, a very desirable phenomenon indeed. What I do mean is that the undeniable allure which characterizes operating on precise cognitive conceptual apparatus of contemporary logic turns logicians into esthetes, so to speak; into men who busy themselves with art for art's sake. I wish to stress this: "art for art's sake" in logical investigations is not when the construct characterized by axioms, which constitutes a given formalized language or family of languages, is very far from what we usually term 'colloquial language'. A theory systematizing an interpretation (which such axiomatic characterization of a formalized

language predominantly is) may describe the contents of the awareness of an ideal type, e.g. the ideal "speaker-listener," that can be very, very far from the contents of the awareness of actual individuals — as long as there exists the possibility (so far an intuitive one) of a concretization for the idealization, constituted by the act of assuming this theory to be an expression of the awareness of concrete individuals. No: art for art's sake is when a theory is constructed which may even be a "realistic," as it is sometimes said, theory, but which leads to a non-effective idealization. Art for art's sake is when all the effort is focused on deducing, from the assumed set of axioms, theses which are (at best) the most surprising from the point of view of the initial intuitions.

Our aesthete is, of course, not in the slightest bit interested in the option of the concretizing application of the results he has obtained in order to explain actual phenomena occurring in the sphere of the colloquial or scientific language communication. In particular, descriptions of the language of empirical sciences which are constructed in this way may, if you will, be "logically pure" and "subtle" idealizations — the neo-Positivist description is a case in point — but they are entirely ineffective and they ignore the results of source research concerning the history of sciences. I am certainly not proposing that a logician doing research on the language of empirical sciences must conduct an in-depth analysis of historical sources himself (although I do not see any reason why he should not). But if we really have to stick to tradition — i.e. the belief that a logician's task is principally to "do the deductions," to produce appropriate interpretation-systematizing theories — at least let that logical production of idealizing concepts take the requirement of their effectiveness under consideration. In view of the current state of methodological knowledge, this means at least an intuitive "trial for size" of those concepts to empirically given facts coming from the area of scientific research practice and from the history of this practice.

Thus, the first danger faced by the logical investigation of language, the language of science in particular, lies in their being isolated from empirical facts, in producing ineffective idealizing concepts which do not possess their concretized counterparts, be it very "distant" ones. What many logicians consider to be the characteristic feature of their research (and a feature that places that research in opposition to research deemed "historical") is nothing but a shortcoming and a fault of that research. This flaw often turns their research into a purely "esthetic" game, which differs from similar conceptual games, played by some other branches of humanities, only in the small detail of being governed by the laws of formal logic and not by stylistic and literary

principles.

On the other hand, it must be emphasized that this obstinate sticking to certain interpretation-systematizing theories, the lack of attempts at producing a concretized interpretation referring to specific empirically given facts coming from the area of scientific research practice and from the history of this practice, may to some extent be excused. What the linguistic research, be it synchronic or diachronic, and the investigation of the history of sciences have to offer in this respect is usually unsuitable for a concretized interpretation. This is because the results of those investigations are, as a rule, not formulated by means of concepts which would be concretized counterparts of idealizing logical concepts. What is found there instead are idealizing concepts of a different type — after all, the logical investigation of the language of science distinguish mostly actions and constructs which have a direct or indirect cognitive meaning — but the most important role is here played by the phenomenalistic approach of the researchers. This approach cannot lead to the actual elimination of even the most implicitly intervening idealizing concepts; yet it effectively prevents scholars from grasping the methodological role of those concepts or noting the fact that concepts applied in the framework of research that is seemingly purely "idiographic" are concretized counterparts of the former ones, and thus "logically" assume them.

Thus we have reached the point at which it is possible to characterize the second of the dangers that await the logical investigation of language. A logician wishing (most rightly) to get in touch with related disciplines: synchronic linguistics, the history of language or the history of sciences may fall prey to an illusion created by the phenomenalistic or at least actualistic *façon de parler* that is so readily applied in those disciplines, and thus be far too quick to renounce the idealizing conceptual apparatus of logic in favor of the so-called "pragmatic" or "historical" description. In fact, the reasons for this renunciation may differ; but, in any case, it leads to the loss of the capability of theoretically explaining various facts in the area of scientific practice (especially facts in the area of linguistic practice in scientific communication) from the point of view of logic.

This is definitely not a purely theoretical danger. The extremely influential assertion of P. K. Feyerabend is worth recalling here; he considers that a change occurring in a given empirical discipline and relying on a renunciation of an old theory in favor of a new theory that is incompatible with the old one, is impossible to characterize in logical terms. Also worth recalling is the position of the representatives of analytical philosophy (inci-

dentally, Feyerabend's antagonists), to whom the conceptual apparatus of logic is useless for the investigation of the actual language of science or the colloquial language.

4.

The fundamental condition for the further development of the view outlined here: that the idealizing concepts — which are used explicitly or implicitly in all humanistic sciences and are equally indispensable in historical or in logical investigations — only then acquire the right to be present in empirical sciences when there exist their concretized counterparts which guarantee their effectiveness, is a re-creation of certain schemata of the principles of coordination assumed in the humanistic scenes, which define the appropriate procedures of concretizing the assumption of effectiveness. I think, however, that even before such schemata are defined — that is, knowing only generally (on the basis of, among others, analogies with the practice of concretizing in natural sciences) what the procedure for the humanistic concretization, which is of interest to us here, actually is — it is possible, as I have already indicated, to formulate suitably general necessary conditions of the empirical applicability of idealizing concepts. Even if, knowing only those conditions, it is impossible resolve whether particular humanistic, and especially logical idealizations have the value of effectiveness ascribed to them, that they contribute to us getting a general idea as to this. Yet, to conclude, I would like to show an example of how, in some cases, even that general idea makes it possible to formulate arguments against the use of some types of idealization.

Let us return to the idealizing context of a hypothesis defining the communicative sense of a language statement, which was described in the first part of the current essay. It is not, as I have already indicated, the full context of such a hypothesis, since statements which create the above context indicate only a certain characterization of the statement. This characterization would be formulated if its author fulfilled the idealizing conditions expressed by premises (1) and (2), and if he was not hampered by some objective factors not regarded in his knowledge; yet the actual, empirically given statement, the observation of which provided empirical evidence for our hypothesis, may seriously differ from the ideal type revealed by the characterization resulting from premises (1) to (3). This, in order for the hypothesis on the communicative sense to be verifiable, is necessary to first conduct an idealizing interpretation of the statement, and then conduct its concretized interpretation, which ought to explain the features

of the actual statement formulated in terms of its divergence from the ideal intended statement. In addition, those differences should arise from the divergence between the knowledge and norms of the actual author of the statement from the knowledge and norms of the corresponding ideal type arising from premises (1) and (2), or from the divergence between the image of reality provided by that knowledge and the actual state of affairs.

From the point of view of the issue which I intend to discuss below, the following fact is especially important: that in the framework of the concretized interpretation, with all the possible "corrections" introduced into the ideal knowledge and norms of the subject of the action, one factor remains unchanged in all cases: the hypothesis about the sense, for instance the communicative sense of the statement. This hypothesis may be, of course, rejected as a result of the concretization procedure, but it does not change within the framework of this procedure. We may easily discover that the above assertion does not result from some purely theoretical speculation by becoming aware of our own practices in the framework of the everyday process of language communication in which we engage colloquially, especially in the case of various interferences, such as illegibility of someone's handwriting, noise on the telephone line, careless pronunciation or speech defects, insufficient grasp of the language in which the conversation is held (e.g. by a foreigner) etc. In such cases, the heard or deciphered statement always differs very considerably from the ideal statement, which should be formulated with the internally ideal and externally adequate language competence; and then, we always endow this actual statement with the meanings of an ideal statement, the circumstances of the types characterized above serve as an explanation of the divergences.

The currently valid conclusion, i.e. thesis B, can be expressed as follows:

Thesis B. Humanistic interpretative practice follows the norm that the ideal type of a given action should possess the same sense as its concretized counterpart.

In the article *The Paradox of Meaning Variance*, J. Giedymin asserts that "[...] in any empirical theory there are two non-empty classes of statements (theorems): the class of statements, which together with certain methods, such as so-called ostensive definitions, determine the meanings and so the denotations of primitive terms and the class of statements which express the theory's empirical content" (Giedymin 1970: 260).

It must be added here that the theses which "express the theory's empirical content" are falsifiable, i.e. the theory does not postulate their

veracity, whereas the theses which "determine the denotations of primitive terms" are either the so-called meaning postulates (postulates of the language of the theory) or some statements which are non-retractable (as long as the theory has value) and which, on the strength of ostensive definitions, state some observational predicates referring to some observable objects.

I wish to refer to the last point: the assumption that, in the language of empirical sciences, there exists such observational sentences whose predicate in the situation predicted by the so-called ostensive definitions is virtually enforced by the very meaning of descriptive terms present therein. It seems that the enthusiasts of this conception — the conception of the "observational meaning postulates," so to speak — do not protest too energetically when we point out to them the fact that, in the framework of the investigation of the history of empirical sciences, such "observational meaning postulates" have so far never been found, which is rather suspicious considering that they are supposed to play such a crucial role: the role of a determinant of the meaning of descriptive terms. While they do not deny the fact that the "observational meaning postulates" are indeed not used in the research practice, their enthusiasts assert that it is with reference to that concept that we conduct the idealization of this practice, its so-called logical reconstruction.

What I have in mind is this: if the ideal action of stating an observational statement regarding the sense of the "observational meaning postulate" was to have its concretized counterpart, even the most "defective" one, then — in accordance with thesis B — this counterpart ought to be ascribed in an identical sense in every case. However, it is rather generally agreed upon that, in reality, such counterparts do not exist. From this, it would follow that the idealization of interest to us here is an ineffective one. The empirical researchers do not discover the actual existence of sentences that would have the nature of "observational meaning postulates" not because they possess an inherently imperfect, inadequate knowledge of how that should be done, but because they have never wished to undertake such an exploit.

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Leszek Nowak

REMARKS ON THE RELATIONSHIP BETWEEN LOGIC AND LINGUISTICS

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The aim of this paper is to challenge a particular methodological hypothesis regarding the relation between logic and linguistics and to replace it with a different one.

1.

The hypothesis I would like to criticize was put forward by Kazimierz Ajdukiewicz in the following words:

Problems of language analysis are of interest to both linguists and logicians. One of the most important differences between the linguistic and the logical analysis of language is the fact that linguistic investigations are concerned with natural languages whereas logicians study artificial ones. [...] The relatively greater simplicity of the languages studied by logicians enables them to give a clearer account of the structure of those languages than is possible in the case of the analysis of complex natural languages.

However, since the languages studied by logicians are in many respects modelled on natural languages, it seems that logicians may be able to make some contribution to general linguistics. It is most probable that the results of the logical analysis of languages cannot be applied without qualification to the empirically given natural languages; that their analyses which ignore certain moments characteristic for natural languages require far-reaching modifications to be applicable to natural languages. Possibly this situation is similar to the one in physics. Physicists also formulate some of their laws for ideally simplified cases which do not occur in nature. They formulate laws for ideal gases, ideal

liquids, for frictionless motion, etc. For those idealized cases it was possible to find simple laws which have contributed essentially to our understanding of reality; had physicists acted otherwise, trying to describe reality in all its complexity, they would probably not have been successful.

Now it seems that the languages analysed by logicians may also be regarded as an idealization of natural languages and maybe this idealization makes it possible for logicians to reach deeper into the nature of linguistic entities than linguists have been able so far to do. (Ajdukiewicz 1978b: 269; cf. Grzegorczyk 1974)

This thesis — that a formalized language is an ideal type of natural language — seems to be becoming increasingly popular among Polish logicians. Apparently, however, the thesis is false, and so is the claim that the relation between formal logic and linguistics resembles that between, say, theoretical mechanics and the mechanics of materials.[1]

Take an arbitrary law of physics formulated for "ideally simplified cases." Let it be the law of free fall in a vacuum: $ma = w$ (where m — mass, a — acceleration, w — weight of the falling body). Since the law is meant to be valid for bodies falling in a vacuum, its complete formulation runs as follows:

(1) If x is a body falling freely in the vicinity of the Earth, and the air resistance against x equals zero, then $m(x)a(x) = w(x)$.

The law applies to physically unrealisable, idealized cases in which resistance of the medium equals zero. In order to account for the real fall of bodies, which always occurs under the conditions of non-zero resistance, physicists 'concretize' the law. That is to say, they confront (1) with the additional assumption that the force accelerating a body in a vacuum differs with respect to the value of air resistance from such a force under non-vacuum conditions and obtain the law of free fall which takes into account the air resistance:

(2) If x is a body falling freely in the vicinity of the Earth, and the air resistance against x is greater than zero, then $m(x)a(x) = w(x) - R(x)$,

where $R(x)$ stands for air resistance. Law (2) already applies to real situations (given the simplifying assumption that (1) does not involve more assumptions like the one eliminating air resistance).[2]

Let us generalize this case and call a sentence of the following form an

[1] "Insofar as theoretical mechanics could be called mechanics of an ideally rigid body, the mechanics of materials could be dubbed the mechanics of a real rigid body" (Szmelter 1966: 7).

[2] A precise reconstruction of this example can be found in (Nowak 1971b: 54—57), together with elucidation of the notions of idealizational law, strict and approximate concretization.

IDEALIZATIONAL LAW:

(3) If $G(x)$ and $p_1(x)$ and ... and $p_k(x)$, then $F(x)$,

insofar as the assumed nomothetic knowledge (containing strictly general sentences) does not entail that there are no objects with property G, but it entails that there are objects which have G while lacking p_1, p_2, ..., and p_k. I call condition $G(x)$ a REALISTIC ASSUMPTION, while the remaining conditions shall be either IDEALIZATIONAL ASSUMPTIONS (if the assumed knowledge entails that no object with property G has any of the properties p_1, p_2, ..., p_k), or QUASI-IDEALIZATIONAL ASSUMPTIONS (if only some of the G-objects lack all of the properties p_1, p_2, ..., p_k). In law (1) the first assumption is realistic, while the second one — postulating the lack of air resistance in the vicinity of the Earth — is idealizational. In this case the concretization of (1) consisted in dismissing the idealizational assumption and establishing law (2), which contains in its antecedent a realistic assumption incompatible with the former one, and in the consequent — a suitable correction. More generally, a STRICT CONCRETIZATION of law (3) is a law of the form:

(4) If $G(x)$ and $p_1(x)$, ..., $p_{k---1}(x)$, and $\tilde{}p_k(x)$, then $F'(x)$,

where $F'(x)$ contains a correction to "$F(x)$" resulting from the rejection of idealizational assumption $p_k(x)$.

Now, idealizational laws are tested by means of concretization; if a concretization results in deriving a FACTUAL LAW (i.e. containing neither idealizational assumptions, nor quasi-idealizational ones), this law can be tested by deriving observational predictions from it. If these predictions turn out to be false, the factual law is refuted, together with the idealizational laws it was derived from by means of concretization.[3] For instance, rejection of statement (2), which may be used to put forward observational predictions, forces us to reject the idealizational law (1).

The general conclusion would be that idealizational laws are empirically decidable, and thereby they are synthetic sentences. But if we accept the account of formal logic according to which the theorems put forward in this discipline are analytic sentences, then we should conclude that they are not idealizational laws. Therefore, it would be wrong to accept the

[3]Some qualifications are in order here — cf. Nowak 1971a, chap. 11. Let us add that testing idealizational laws usually results in an APPROXIMATE CONCRETIZATION: it is granted that the so far unrefuted idealizational assumptions are "sufficiently well" satisfied by the real objects, so that also the consequent of the idealizational statement "approximately" applies to them. In the case of quantitative statements the concept of approximation gains a precise meaning (Nowak 1971: chap. 9).

above-mentioned methodological hypothesis, which may be expressed in the present terminology as follows: linguistic theories are concretizations of the theories formulated by logicians.

2.

The idea that formal logic is an idealizational theory of natural language seems as wrong as the idea that geometry is an idealizational theory of physical space. For it is necessary to distinguish geometry as a branch of mathematics, containing theorems that are analytic sentences (e.g. for a given point outside of a straight line, there is only one straight line parallel to the given straight line and passing through the given point), from the idealizational theory of physical space, whose theses are idealizational laws (e.g. if x is a material point, y is an edge of an ideally rigid body, and x does not lie on y, then there is exactly one edge z of an ideally rigid body such that x lies on z and z is parallel to y). The statements of the latter discipline are already synthetic sentences, which could be refuted provided that the corresponding statements of the factual theory of physical space turn out to be false; the latter speak of real objects that are 'sufficient approximations' of the ideal types from the realm of theoretical physics: a photon (which can be a sufficient approximation of a material point), a photon trajectory, etc. Accordingly, pure geometry, which is a set of analytic sentences, must be distinguished from idealizational theory of physical space, which is a set of idealizational laws such that their antecedents contain idealizational assumptions, establishing suitable ideal types, whereas their consequents contain names of physical relations isomorphically mapped onto geometrical relations described in pure geometry. Pure geometry is a branch of mathematics, while idealizational theory of space is a part of physics. A factual theory of space, which is a (usually approximate; cf. above, n. 3) concretization of the latter theory, constitutes another branch of physics.[4] The factual theory can be refuted, and the idealizational theory of physical space follows suit. By contrast, no system of mathematical geometry can be refuted. At most, a new idealizational theory of physical space can be based on a different system of pure geometry (e.g. on Riemannian rather than Euclidian geometry).

Briefly, we should distinguish two types of idealizational laws (and, by the same token, two types of theories). A law such as (1) presupposes a formal formula $AB = C$ (where A, B, and C are numerical variables), which is not

[4]This notion is discussed more broadly in (Nowak 1972b).

an analytic sentence (of the language of arithmetic). Law (1) is established by assuming that variable A runs over the set of real numbers that are measures of mass, B — the set of real numbers that are measures of acceleration, C — the set of numbers that are measures of weight, and by preceding the formula interpreted in this way with suitable assumptions (including idealizational ones). Another type of idealizational law is given, for instance, by laws of the idealizational theory of physical space. The formal formulas presupposed by them are analytic sentences (of the language of geometry). They are the result of assuming that a point in the sense of pure geometry corresponds to a material point and preceding the resulting expression with suitable idealizational assumptions that constitute the material point etc. Generally speaking, the IDEALIZATIONAL LAWS WITH ANALYTIC BASIS shall include idealizational laws such a (3), in which relation F (defined on ideal types of physical objects), denoted by predicate F, is isomorphically mapped onto relation M (defined on abstract objects postulated in a certain formal discipline, such as numbers, points in the geometrical sense); if that predicate does not occur in a theorem of a formal discipline but just in an expression which can be formed in the language of that discipline, then a law of the form (3) is an IDEALIZATIONAL LAW WITH SYNTHETIC BASIS.

Now, it is easy to see that theorems of formal logic are neither idealizational laws with synthetic basis (like law (1)), nor idealizational laws with analytic basis. It is so, because both kinds of laws are synthetic sentences. Both are under control of experience, albeit indirectly — by means of concretization.

3.

It is possible, however, to distinguish formal logic from the logical theory of natural language, which is an idealizational theory with analytic basis. The relationship between such a theory and formal logic would be analogous to the relation between theory of physical space and pure geometry. Let us illustrate this issue with an example.

In his paper "A Semantical Version of the Problem of Transcendental Idealism" Ajdukiewicz (1978a) sought to prove the falsehood of Rickert's idealist thesis by employing a theorem of formal logic according to which every formalized system richer than arithmetic is incomplete. In the course of his argumentation he adopted a reasoning which I will try to analyze here. In demonstrating the invalidity of Rickert's view Ajdukiewicz claims that:

Now, as we know, even axiomatized arithmetic cannot be made complete. Since the language of natural science contains as its part the language of arithmetic,

it is obvious that the language of natural science cannot be made complete, i.e. there will be in it pairs of contradictory sentences such that neither sentence of a pair is a theorem. Nevertheless, in accordance with the law of excluded middle, one of those sentences is certainly true. (Ajdukiewicz 1978a: 150)

Let us attempt to reconstruct this reasoning. The author starts with a theorem of formal logic:

(5) If T is a formalized system and T is richer than arithmetic, then T is incomplete.

(5) is a consequence of the meaning postulates of the language of metalogic, and as such it is an analytic sentence of this language. A formalized system is understood here as a set of sentences with specific axioms and a given consequence operation. The theorem is satisfied in the abstract domain of logical items in which it is interpreted, just as Euclid's axioms and their consequences are satisfied in the domain of geometrical items. It is, therefore, pointless to ask — under the above interpretation — whether (5) is satisfied in the domain containing, for instance, the language of natural sciences. Instead, we might want to ask whether it is right to accept the idealizational statement which says something about language considered as an ideal type of the language of natural sciences (i.e. pointing out the differences between this ideal type and the language of science) and 'transfers' the relationships described in theorem (5) to this ideal type. Such a statement could run as follows:

(6) If T is a language,[5] and the users of T at time t employ only certain simple expressions and combine them only in so many ways (so as to form complex expressions), while taking only structural properties of those expressions into account and accepting either exclusively sentences from a specific list or sentences that stand in structurally defined relations to other sentences, ..., etc., then if T contains arithmetic, then there are contradictory sentences in T, none of which is affirmed by the users of language T at time t.

Thesis (6) is no longer a theorem of formal logic. It speaks of ideal language users, since the assumptions listed in its antecedent undoubtedly include idealizing conditions. In fact, those conditions are not set out in full, and an increase in our knowledge about natural languages will force us to list a growing number of new deviations of those languages with respect to a formalized language in the sense of formal logic. For this reason alone, it cannot be said that laying out those conditions amounts to expanding

[5]In the ordinary sense of "language."

the definition of formalized language; if that were the case, the definition would constantly change, whereas it is known that the concept of language in formal logic is firmly set.

Now, what Ajdukiewicz really assumed in claiming that the language of science is incomplete was some idealizational statement such as (6). And it is this statement that was used as the basis for deriving his thesis regarding incompleteness of the language of natural science: apparently, Ajdukiewicz assumed that the deviations of its users with respect to the 'ideal users'[6] described in the antecedent are insignificant in a short period.[7] It might be said that thesis (5) belongs to formal logic, while (6) — to a logical theory of natural language, and the statement put forward by the author regarding the language used by scientists — to a factual theory concretizing the logical theory of natural language.

If the above remarks are correct, the relationship between formal logic and logical theory of natural language would be the same as the relation between pure geometry and idealizational theory of physical space: the former argument of the relation would be the analytic basis for the latter. To put it another way, the latter would be idealizational theories with analytic basis in the former. Various systems of formal logic would constitute analytic bases for different logical theories of natural language, just as various systems of pure geometry constitute analytic bases for a variety of idealizational theories of physical space. At the same time, experience would be unable to determine the 'truth' of various logical systems: insofar as they consist in sets of postulates and their consequences, they are all satisfied; experience could only determine the truth value of various logical theories of natural language. The latter could be regarded as subject to the control of experience, although this control would be exercised indirectly — through the concretizations of those idealizational theories.

In general, therefore, if $T(x)$ is a theorem of formal logic (where x runs over a set of abstract items investigated in logic), then a thesis of logical theory of natural language falls under the scheme:

(7) If $G(x)$ and $p_1(x)$ and ... and $p_k(x)$, then $T(x)$,

where the first assumption is realistic in character, while the remaining ones are idealizational or quasi-idealizational. A question arises as to how theses of the form (7) come to be concretized.

[6]See the notion of rational linguistic subject in (Nowak 1970: 113).

[7]The whole process is a kind of approximate concretization, albeit performed intuitively.

4.

First, let us distinguish — from a completely different point of view — three kinds of idealizational laws. Namely, an idealizational law of the form (3) belonging to THE FIRST KIND when all of its assumptions are realistic and idealizational. IDEALIZATIONAL LAWS OF THE SECOND KIND contain: realistic assumptions, idealizational assumptions, and quasi-idealizational assumptions. Finally, IDEALIZATIONAL LAWS OF THE THIRD KIND contain idealizational assumptions and quasi-idealizational assumptions.

This distinction of three kinds of laws is relevant as far as we consider the method of their concretization. The laws of the first kind can be concretized either strictly, or approximately; usually they are first strictly concretized and then it is concluded that the ideal type represented by the last of those concretizations deviates from the real objects to a relatively small degree, and it is possible to predicate of them, with some approximation, what is precisely predicated of the ideal type. Laws of the third kind can be non-trivially satisfied by some real objects — those that in addition to G have properties $p_1, \ldots, p_k$. In this case we carry out a LIMITED CONCRETIZATION: we establish a subset of G, Q, to which the law (3) can be directly applied on the grounds that every object from Q meets the initial conditions of (3); as for the G-objects not belonging to Q, law (3) can be applied to them only by means of strict or approximate concretization (limited strict concretization and limited approximate concretization, respectively). Finally, in the case of idealizational laws of the second kind, the above methods of concretization are applied jointly: with respect to the idealizational assumptions we use strict concretization, whereas with respect to quasi-idealizational assumptions — the limited one.

The statements of logical theory of natural language are usually of the second or third type. Accordingly, they can be concretized by means of:

A. strict concretization, and then limited strict concretization,

B. strict concretization, and then limited approximate concretization,

C. limited strict concretization,

D. limited approximate concretization,

E. approximate concretization.

The last two modes of concretization can be easily encountered in the works of 'applied logic'. An example of concretization of type (E) is given by Ajdukiewicz's reasoning discussed above. It is worth adding that this type of concretization is always performed in an intuitive way, i.e. without specifying what is meant by saying that a given language "approximately"

meets the idealizing conditions.[8]

An example of concretization of type (D) is provided by Barbara Stanosz's discussion on the applicability of the theory of truth to ordinary language. The author regards Tarski's arguments for inapplicability of his theory to ordinary language as irrefutable. Nevertheless, she enumerates the respects in which everyday language differs from a formalized one, to which the theory of truth can be applied (Stanosz 1971: 83—84), and thereby — to put it in our terms — she sets out the idealizational assumptions of the theory of truth for natural language. Stanosz states that the theory is not applicable to natural language as a whole, yet she seeks to pick out a fragment of natural language to which the theory could be directly applied. It could be nothing but a fragment, because "the formal nature of this construction [...] restricts us to the definition of truth for a functionally independent fragment of natural language" (Stanosz 1971: 90). Thus she uses limited concretization.

Accordingly, one of the aspects that distinguishes natural language form a formal one is that the former contains names of its own expressions, which leads to the liar paradox. From this, Tarski draws the conclusion that ordinary language is inconsistent. But Stanosz declares:

> It seems that Tarski's arguments in this matter, and thereby his conclusions, cannot be dismissed; however, they could be, as it were, weakened by pointing out the non-paradoxical nature of a concept that is sufficiently similar to the notion of truth so that it is able to play its role in a semantic theory of natural language. It is the concept of truth relativized to a suitable fragment of natural language. [...] More generally, by relativizing all semantic notions to a fragment of a given language which does not contain the semantics under construction, we steer clear of semantic paradoxes. (Stanosz 1971: 88)

In other words, Stanosz specifies the extent to which ordinary language satisfies the quasi-idealizational assumption of an idealizational theory of truth for natural language which postulates non-paradoxicality of language. Another quasi-idealizational assumption of this theory is the condition establishing structural character of all syntactic rules:

> In this case the limitation of the project that would enable us to avoid this obstacle is neither drastic, nor unprecedented: it would consist in applying the definition of truth only to expressions which are syntactically independent sentences, i.e. can perform the function of sentences in any circumstances of utterance. (Stanosz 1971: 89)

[8] This feature is typical of the humanities — see Nowak 1972a: chap. 6.

The fact that we are dealing with limited concretization is additionally brought out by the following comment:

It is, however — let us repeat — a limitation of the project: a peculiar aspect of understanding natural language expressions is removed from the range of the explained phenomena. (Stanosz 1971: 89)

The author proceeds in a similar way when she cancels out other assumptions of this type: they are easily recognized as quasi-idealizational assumptions, and her procedure — as concretization of type (D).

5.

The most interesting cases of concretization are (A)—(C). At the same time, however, they are the most difficult ones for methodological reconstruction. I will settle for putting forward a hypothesis: linguistic theories are strict concretizations (of types (A)—(C)) of logical theories of natural language. It is easy to see why a reconstruction of these methods of concretization is so tricky — it would have to be carried out in the following stages:

1. Reconstructing the structure of a given logical theory of natural language, that is — setting out the idealizational (or quasi-idealizational) assumptions of this theory and systematizing its theses.

2. Reconstructing the structure of a given linguistic theory.

3. Comparing the idealizational assumptions of both theories and — if it turns out that the linguistic theory does indeed contain less idealizational assumptions — determining the nature of the 'corrections' introduced to the linguistic theory as a result of cancelling those assumptions.

Yet what I call the logical theory of natural language has never been explicitly formulated: it would be necessary to reconstruct idealizational assumptions of such a theory on the basis of an analysis of actual research conducted by those who apply logic to natural language. Likewise, the idealizational assumptions of linguistic theories are seldom expressly stated, so they stand in need of reconstruction. Consequently, until someone accomplishes the methodological reconstruction of both theories, stage 3 remains out of reach, that is, there is no way of determining whether one of them concretizes the other.

Nevertheless, perhaps the above hypothesis could be corroborated. Consider the following statement by Noam Chomsky, in which he describes the methodological status of his theory:

Linguistic theory is concerned primarily with an ideal speaker-listener, in a completely homogeneous speech-community, who knows its language perfectly and

is unaffected by such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his knowledge of the language in actual performance. (Chomsky 1965: 3)

Assume for the sake of discussion — although it is certainly an idealizational assumption — that this is a complete list of idealizational (or quasi-idealizational) assumptions of Chomsky's theory. Now all these assumptions are undoubtedly adopted in the logical theory of natural language as well, which, however, also adopts a variety of other assumptions disregarded in Chomsky's theory. The latter is, therefore, less abstract than the former. So we might be dealing here with a relation of concretization. Yet the question of whether it is the case calls for serious analysis.

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Witold Marciszewski

FORMAL CHARACTERISTICS OF THE DOMAIN OF CONSIDERATIONS AS A BASIS OF THE SUBJECT INDEX

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1. Types of indexes on account of the structure of the index entry

What we are going to discuss here are subject indexes in scientific works, leaving aside other types of indexes, also called *skorowidze* (general indexes). These types of indexes were once mentioned by a 17^{th} century bibliographer who said that due to their great significance, they should always be made by the book's author, while the book itself might be eventually written by somebody else (Carey 1951).

Publications concerning indexes in books are rather scarce and usually devoid of theoretical ambitions, contrary to publications devoted to indexing as an operation related to the characteristics of documents' content (e.g. books, articles, etc.) in bibliographies, subject catalogues or information-searching systems. However, there are similarities between these two groups of indexes, in the form of the similarity of the main aim which is to help in efficient information searching. When it comes to information contained in the text of one work, we are dealing with the index of this work; however, when the research subject is the information contained in any document of a specific collection (e.g. a library), we are dealing with an index related to a catalogue, bibliography, etc. Due to such a similarity in function, it will be possible to use results concerning the other types of indexes in considerations about indexes in books.

We shall compare here a few types of indexes taking into consideration differences concerning the structure of the index entry; in the simplest case, the index entry consists of the headword, i.e. the term which may be the subject of the search and which is as if the title of the index entry, and the number referring to pages (or passages) of the text which contains this term. In more complex cases, there are references to other headwords and descriptors; the latter making more precise in what aspect or point of view may the concept expressed in the headword be considered; because of certain reasons it will be more convenient to replace the word "descriptor" with "subheadword."

Taking into consideration the content and the construction of the index entry, at least three types of indexes (here marked by means of consecutive Arabic numbers) should be differentiated.

(1) INDEX OF THE TYPE "UNITERM," which is a result of the so called coordinate indexing. This type of index is a collection of headwords, from which every is a single term and does not contain any cross-references. Below each headword there are numbers of all documents which contain the term. The relationships between the terms which constitute the headword are discovered while searching through the index and comparing the numbers recurring under various headwords; if the same number occurs e.g. under the headwords "radiation," "detecting," "instruments," then it indicates the fact that the document marked with the number concerns the detection of radiation by means of instruments. When compiling such an index in the case of a work about producing coal, we will put the number of this work under the headwords "production" and "coal."[1]

(2) INDEX IN WHICH THE HEADWORD IS ALWAYS A GROUP (PAIR, TRIPLET, ETC.) OF SINGULAR TERMS. The group is not a complex expression (because it lacks syntactic connections), but a certain sequence of words. What hints at the relationships between words is their meaning. Here follows, as an example, two entries of this type:

Radiation — Detecting — Instruments (that is "detecting radiation by means of instruments");

Coal — Production (that is "production of coal").

There are two variants of this type, depending on whether the sequence of terms in the headword is random, or whether there is an established order for such terms, e.g. an order based on Ranganathan's five categories, which are

[1]The idea of coordinate indexing was created in the environment of Documentation Incorporated — the organization whose leader was Mortimer Taube. The method was described in a series of works: Taube (1953-1957). Cf. also Becker (1964).

scaled according to the degree of "concreteness."[2] When the order is random, it might be advisable to transform the group into as many headwords as there are terms in the group, changing only the term in the first place which determines the headword's place in the alphabetical order, for example:

Radiation — Detecting — Instruments;

Detecting — Radiation — Instruments;

Instruments — Radiation — Detecting.

In such an arrangement of headwords there is no need of cross-references to other index entries, because there is an "entry" to the index through any of its terms (Vickery 1959).

(3) INDEX INDICATING THE RELATIONSHIPS BETWEEN TERMS IN THE INDEX ENTRY, that is between the headword and each of its sub-headwords. Indicating that the relationship takes place in one of at least three ways: (3a) by means of expressions from the language of a given document or common language, or (3b) by means of a special rule of ordering terms, or (3c) by means of a small number of symbolic expressions, which are introduced as shorter markings of relations. And here follow examples of these solutions.

What can illustrate (3a) is a typical index used in PWN's "Biblioteka Klasyków Filozofii" (Library of Classic Philosophical Writers). In the general index of *Meditations* by Descartes (published 1958) there is, for example, the entry:

Spostrzeżenie zmysłowe (perceptio) jako pouczające o istocie ciał I 110; s-a jasne II 264; s-a mętne I 105; s-a niejasne I 105; s-a z. jako reguły bezpośredniego rozpoznawania ciał poza mną I 109; s a wola I 102.

(Sensuous perception (perceptio) in the context of the essence of bodies I 110; clear perception II 264; vague perception I 105, unclear perception I 105; perception as rules of direct recognition of bodies external to me I 109; perception versus volition I 102.)

[2]The categories mentioned by Ranganathan (cf. (3)) are as follows: personality, matter, energy, space, time. It is supposed to be a scale based on the principle of decreasing "concreteness". The concept of concreteness is not easily explainable in this context; most probably it is a "bundle" of a few philosophical intuitions — matter is less concrete than personality, for it is an abstract component of personality, but energy is less concrete than matter in a different sense — because it is less perceptible by our senses; in yet other senses, the concreteness of time and space is compared. For practical reasons it is sufficient that there is any order, even if it is completely arbitrary, hence it is possible to ignore the philosophical motivation. Ranganathan's ideas are presented e.g. in Foskett (1964). There is also a lengthy supplement devoted to the categories in Vickery (1959).

All expressions mentioned in the body of this headword, except for the last one, can be represented as concerning the relation of inclusion, for they enumerate different classes — either superior or inferior — to the class of sensuous perception. The last information "perception versus volition" also indicates a relationship which is not, however, further characterized.

To illustrate (3b) let's assume the rule that what is mentioned first is a thing, then a part of the thing, a property of the thing and a unit of this property; alternatively, what is mentioned after the thing is a property or a process, then an operation made on the thing, and finally an agent of this operation. the headwords below follow this rule:

Antibiotics (thing) — Production (operation) — organisms living in the soil (agent);

Plants (thing) — Illnesses (process) — Curing (operation) — Antibiotics (agent);

Liquids (thing) — Pressure (property) — Measurement (operation).

The first of these headwords refer to a three-element relation: production of antibiotics by organisms living in the soil; the remaining headwords can be interpreted analogously (Vickery 1959).

The example of conventional notation is provided by Farradane who introduces special symbols for the three relations used in the index: react on, cause, belong to (the latter encompasses both being a part and being a property). If reacting is marked with the symbol /-, the sequence

Morphine/- breathing apparatus,

means that the breathing apparatus reacts to morphine. In order to make such a notification unambiguous, it is necessary to have one additional convention which concerns the order; in the above example the applied convention is that the agent causing the reaction (morphine) is mentioned before the recipient object (breathing apparatus) (Vickery 1959; cf. Vickery 1970). This type of characterizing relation, together with the idea of characterizing the domain of considerations which provides all needed types of relations is a starting point of this project, namely the project of an index which is a certain elaborated version of the type (3c) which shall be called here — relational index.[3]

[3]Thus understood relational index is close to a thesaurus, that is a list of vocabulary adopted in a specific information-searching system. What differentiates a thesaurus from other dictionaries or indexes is the fact that it is a tool of terminological control; for example, from two synonymous terms, one is recommended in a given thesaurus, while the other is forbidden; this strategy is aimed at making the terminology used in the information system unambiguous.

Thesauri have been the object of many considerations, however, they have not al-

2. Index based on the formal characteristics of the domain of considerations (relational index)

Let's start with an uncontroversial statement that there are texts about something (it is a cautious wording which does not settle if there are texts about nothing). If we are dealing with such a text, then what it is about shall be called its domain. "W każdej dziedzinie badań podstawą zainteresowania jest pewien zbiór X przedmiotów. Przedmioty zbioru X mogą być jednak rozważane z różnych punktów widzenia. Specyficzny sposób interesowania się przedmiotami zbioru X ujmujemy wyabstrahowując z pola naszego patrzenia na przedmioty zbioru X pewne relacje R_1, ..., R_n między nimi i pewne funkcje jako szczególny rodzaj relacji" (Each domain of research is basically interested in a certain set X of objects. Objects of set X may, however, be considered from different points of view. The specific way of being interested in objects of set X is captured by selecting certain relations R_1, ..., R_n between objects and certain functions as a special type of relation, from our point of view on the objects of set X) (Grzegorczyk 1963). Symbolically, it is usually noted by means of the following notation:

$$<X, R_1, ..., R_n, F_1, ..., F_k.>$$

The set, symbolized in this notation by X shall be called the universe or the basic set. In more complex cases, what is differentiated except for relations are non-relational properties, with one-argument predicates such as "stands," "shines," "is green," etc.; they are usually mentioned after the basic set, and before relations.

It is convenient to regard properties as sets, which shall be of benefit to us in further considerations. Admittedly, it is questioned from the philosophical point of view, but even if reservations are right, they do not concern the applications which are of interest here. Identifying properties with sets is explained by the fact that every property unambiguously determines a

ways been made with sufficient clarity and the logico-semantic manner required by the subject. A clear and exhaustive account is provided in Soergel (1969: 42, 217): "Thesaurus — eine Sammlung (Menge) von Begriffsbenennungen und/oder zusätzlicher Wörter der natürlichen Sprache und/oder sonstiger Zeichen mit Darstellung von Beziehungen zwischen diesen Elementen, sofern noch folgenden die Kriterien erfüllt sind : (a) die Sammlung enthalt einen merklichen Anteil von Nicht- Vorzugsbenennungen und/oder von nicht als Deskriptoren benutzten Vorzugsbenennungen; (b) terminologische Kontrolle wird angestrebt." The same elements (with only one difference that indicating relations between terms is regarded as optional) are mentioned in Poletyło (1970).

certain set: being green unambiguously determines the set of green things, the property of shining — the set of shining things, etc. Thus, instead of talking about a property, it is possible to talk about a set of objects which are characterized by the property and "represent" it. It is convenient because it allows us to make considerations in a homogeneous and well specified language, namely the set-theoretic language. It is very precious, taking into account that one of the most important needs in the present situation of science is the need which is highlighted in the science of information (in IT) — that of a common and well-constructed language. The attempt to express one of the problems of the information science itself, namely the problem of the subject index, in the language borrowed partly from the set-theory is inspired by a desire to overcome a scientific "tower of Babel."

In common language the term "property" implies fairly constant features, while more ephemeral features are referred to as "state of affairs." In our considerations, we shall adopt this distinction as practically convenient, especially because the word "property" in its broadest sense has become redundant as it can be replaced with the term "set." Certain states of affairs, especially short-lasting ones shall be called events, and certain sequences of events shall be called processes. For example: what is the property of a tree's crown is being green, its state — being lighted by the southern sun, the event — interruption of the wind in the foliage, the process — the circulation of the juices or photosynthesis.

When we are talking about things, sets, properties, states, events, etc., we use concepts which are called ontological categories. The term "category," introduced in Aristotle's work of the same title, refers to very general concepts, by means of which we differentiate basic components or aspects of reality. All philosophical systems are most accurately and concisely characterized by asserting what ontological categories are valid in them.

Ontological categories have recently become popular in information science, because of Ranganathan, one of its main authors and in fact a classic writer in the field of information science. He proposed a new method of indexing, that is characterizing the content of a work by means of a certain set of terms, which is based not on a classification of writings (which in turn owes to the classification of sciences), but on a specific categorization of reality.[4] Ranganathan differentiated five categories:

Personality, Matter, Energy, Space, Time,

which determine the scheme of the work's content characteristics. For

[4]Cf. footnote 2.

example, a book on building wooden houses in Podhale in the 19^{th} century shall be characterized by means of five concepts, which fall under the above categories, namely: houses (personality), wood (matter), building (energy), Podhale (space), the 19^{th} century (time). In our considerations we shall not use Ranganathan's categories, however, the thought of qualifying concepts which occur in the index through assigning an appropriate category to each concept shall be used in a certain way.

Let's formulate the most important rules (ignoring some minor technical issues), which will determine the way of building this type of index, which is called here — the relational index, and which — let's remind ourselves — is a more developed and formalized version of index (3c) discussed in the previous section.

I. The basis for constructing a relational index to a work is the initial creation of formal characteristics of the domain of considerations in a given work, which provides symbols of categories and symbols of relations.

II. Each headword, which is either a single word, or a complex expression, placed in the heading of the index entry, has a category indicator which makes the headword's meaning more precise to a certain account.

III. Each sub-headword is preceded by a symbol of the relation which occurs between the headword and the headword which is the heading of a given index entry.

IV. Each single term A which is a sub-headword of an index entry containing term B occurs — in alphabetical order — as a headword whose sub-headword is in turn term B. If a sub-headword is a complex expression, at least one of its elements is a headword in the order; if the element is not the first word of the expression, then this is indicated by the preceding asterisk.

V. Each sub-headword is followed by numbers which indicate parts of the text (pages or sections), which concern the relationship between this term and the term's headword (within the index entry); what follows later — after a semicolon, in case of need, are parts of the text which elaborate on the sub-headword's definition. The headword itself is accompanied by numerical indicators of parts of the text only if the sub-headword's indicators do not exhaust all important contexts of the term in the headword; other contexts are enumerated then in the entry after the symbol of category.

VI. When there are synonymous terms in the index (which is indicated by the symbol of equivalence relation), then each of them is a headword in the order, but all relations to other concepts are mentioned under only one of them (which is differentiated on account of e.g. frequency in the text,

occurring as a title, etc.); entries for other synonyms, however, inform about the equivalence relation occurring between the synonym and the selected term and refer back to the selected term by means of the instruction "see further."

If the index's author did not see the need or considered it too difficult to characterize a headword on account of categories, rule II can be omitted without distorting the index's structure determined by the remaining rules. However, it is desirable to use rule II because of certain ambiguities related to the variation of categories caused by various senses of the same word, e.g. "dinner" in the sense of dishes on the table (category of things) and "dinner" in the sense of the activity of eating the dishes (category of processes).

3. Examples of the relational index

The principles of constructing the relational index and methods of use of this type of index shall be illustrated on the basis of the book *Traktat o dobrej robocie* (*Praxiology. An introduction to the science of efficient action*) by Tadeusz Kotarbiński (4^{th} edition, published in 1969 by Zakład Narodowy Imienia Ossolińskich in Wrocław). The book contains a spacious and detailed index close in type to the one which has been differentiated in section 1 with the symbol (3a): what occurs under each of the more important headwords is not only pages on which a given term is mentioned, but also a discussion of relationships between the term and other terms which are (usually) headwords in the order of the index; the page number given under each term informs about the part of the book in which the relationship between the term and the headword is discussed. Here follows one of the typical examples:

narzędzie 21, 32, 36 — 61, 107, 143, 189 — 201, 282, 283, 319, 379, 477; narzędzia bardziej operatywne niż narząd 191; narzędzia do wywoływania czynów 56; narzędzia do wywoływania doznań 56, 283; narzędzie jako przedłużenia narządów 56, 283, 360; operatywność narzędzia 191 — 196; zwierzęta nie wytwarzają narzędzi, aparatury 56 — 58, 448.

(tools 21, 32, 36 — 61, 107, 143, 189 — 201, 282, 283, 319, 379, 477; tools more efficient than an organ 191; tools for causing acts 56; tools for causing sensations 56, 283; tools as extensions of organs 56, 283, 360; efficiency of a tool 191 — 196; animals do not produce tools, apparatus 56 — 58, 448.)

There are the following relations in the headword:

x is more efficient than y, x causes y, x extends y,

x is good for y (i.e. is efficient in certain uses)

x is not a product of y.

Our task now will be to construct fragments of the relational index to certain parts of *Praxiology*.

According to rule I, we shall characterize the domain of considerations which is of interest in the work. As it is known, *Praxiology* discusses various types of human acts, circumstances and ways of making these acts real, principles for assessing them from a praxiological point of view, etc. Thus, the individuals considered in the book are people and other material things such as tools, organs, etc. Hence the universe, that is the basis set, should be the set of this type of individual. Let's mark it with symbol A. Numerous relations occur between individuals belonging to A, among other things, the ones which are enumerated in the above headword "tool." However, it would not be efficient to mention in the index all the relations which occur between elements of set A. It is desirable to choose and limit a few of the most basic relations which shall have special markings, while all the remaining ones shall be signaled by means of a general symbol which would mean: a certain relation, different than the ones already differentiated by separate symbols.

Relations introduced here as an example are the ones which reoccur most frequently in the analyzed parts of *Praxiology*. An analysis of the whole text would inevitably result in extending the repertoire of relational symbols, and perhaps even in certain modifications within the present repertoire; however, there is no need to elaborate on this issue since our aim is at any example of how the relational index functions, and not at the conceptual analysis of the *Praxiology* itself. We shall assume that the relational functor is marked with a slash and a certain additional symbol, which is different for each particular relation. We shall distinguish relations between individuals from relations between sets in such a way that the former shall have letter symbols which shall be abbreviations of appropriate common language expressions which name the relations, while the latter — symbols used in the set-theory. Moreover, we shall use graphic properties of such a notation to create an inverse relation.[5] For example, let the relation x causes y have its abbreviated equivalent in:

$$x/\mathbf{ca}\ y.$$

Now, if we want to notate the same but as an inverse relation, which shall be expressed by means of the passive voice in common language (y is

[5] An explanation of the sense of all terms deriving from the set-theory and relation-theory used in this paper can be found in any handbook on logic discussing the set-theory and in Marciszewski (1970).

caused by x), then the relation elements exchange their positions and the specific part of the relational symbol is shifted to the other side of the slash, which results in:

$$y \ \mathbf{cs}/x.$$

This technique will be of importance in comparing index entries which are in such a relation that in one index entry a term x is a headword, and y — a sub-headword, while in the other it is otherwise: y is a headword, and x — a sub-headword.

The following relations occur in our characteristics of the domain:

$x/\mathbf{cm}$ y ... x is a component of y; it can be a component in the sense of a body part, part of a process, etc. (let's note: it means the same as y $\mathbf{cm}/x$);

$x/\mathbf{us}$ y ... x is used to (cause) y; or in other words: x causes y, helps y to exist, etc. It seems to be a weaker relation than the above relation **cs**, because it does not decide whether x is a sufficient condition for y, or a necessary condition, or something else (we shall not use the relation **cs** in the approaches to headwords of the index proposed below);

$x/\mathbf{in}$ y ... x is an indicator (symptom, indicate) of y;

$x/\mathbf{:}$ y ... x is a certain specific but not distinguished relation to y.

Using the latter relational symbol of the above list happens when we are dealing with a relation which is not important from the point of view of the considerations, or too complicated to be worth discussing in the introduction explaining the notation and abbreviations, even if it is potentially important. In indexes in which the only way of linking headwords with each other is the reference "see further," it sometimes functions analogously to the symbol /**:**.

Thus the domain assigned to parts of *Praxiology* selected as an example and presented in an appropriate fragment of the index should be characterized by means of the following set of symbols:

$$D = <A;\ /\mathbf{cm},\ /\mathbf{us},\ /\mathbf{in},\ /\mathbf{:}>.$$

It is not, however, the characteristics which is exhaustive, because there is need to take into consideration sets and relations that occur between sets, e.g. the relation of inclusion, in the index. Thus, it is necessary to take one more set into consideration. It is in this set that the relations interesting from our point of view shall occur, namely the set of sets included in A, that is the power set 2^A. Now it is possible to present all ontological categories, which according to rule II are to make the sense of main headwords of our

index more precise, in a homogeneous way. Each of these categories shall be treated as a family of certain sets included in 2^A. Let's consider this by taking as an example relatively constant properties to which human dispositions also belong, such as: intelligence, ability to do acts of a specific type, etc. Such a property, e.g. intelligence, is identified with the set of objects which have this property, that is with the set of individuals gifted with intelligence. While, the mere fact of being a property is identified with the set of properties, thus a certain set of sets.

Another type of properties are fading properties, which we call states of affairs, e.g. the state of having a nap, the state of being in the morning sun, the state of having a defence tool within my reach, etc.; it is a separate family of sets included in 2^A. Except for such (relatively) constant properties, which shall be marked with T, and states of affairs marked with the symbol S, we shall differentiate: processes P, understood as certain time-ordered arrangements of states of affairs; human actions D — as a certain type of states of affairs or processes (it is the proper part of the family of sets $S + P$); relation R — as properties of pairs, triplets, etc. of individual objects, thus as properties of sets, that is a family of sets; finally, two set-theoretic relations which occur between sets, namely the relation of equivalence and proper inclusion; we shall mark them with the symbols $/=$ and $/($, respectively; also, the inverse relation of the proper inclusion, according to the above formulated convention, shall be marked with $(/$. And thus e.g. $X/(\ Y$ means "X is included in Y", while $X(/\ Y$ means "Y is included in X".

Also, it will be convenient to distinguish certain sub-sets of the families T, S and R, namely: constant human features Tc, states of affairs which may be characteristic of human beings Sc, and finally, relations which occur between people Rc. Thus, we arrive at the domain:

$D' = <2^A\ ;\ T,\ Tc,\ S,\ Sc,\ P,\ D,\ R,\ Rc,\ /(,\ /=>$,

in which (let's shortly sum up):

T ... constant properties of any object,

Tc... constant human features,

S ... states of affairs,

Sc ... human states,

P ... processes, that is certain arrangements of states of affairs,

D ... human actions (states and processes whose agents are human beings),

R ... relations,

Rc ... relations between human beings,

$/($ ... proper inclusion (not including the case of the equivalence of sets),

/= ... equivalence of sets.

After the explanations it is possible to present fragments of the index, compiled by the author of the present considerations who used the text of the book and the index of the type (3a) included in the book. Comments to particular headwords are aimed at explaining in greater detail the statements made previously in the section.

1 Being active *Sc*; /= activity (see further) 25.

The category indicator *Sc* tells us that what is meant is being active as a certain state of a human being which is about doing and action, and not being active in the sense of a constant disposition assigned to active people as opposed to passive or lazy, etc. people; in the other case the indicator would be *Tc*. Further, we learn that it is a synonym of the term "activity," and that under the other headword the reader may find a fuller description of its relationships with other terms (this is indicated by "see further"), and that the extension equivalence of both terms is stated on page 25.

2 Alternative *S*; /= contingency (see further) 66.

This entry has exactly the same structure as the previous one.

3 Contingency *S*; /= alternative 66; /= possibility 68; /**cm** situation of *choice 66, *67.

Asterisks in the third sub-headword shall be understood in this way that, except for an explanation of the complex term "situation of choice" given on page 66, the reader may find an explanation of the term "choice" on page 67; the fact that the page number and the term are accompanied by an identical asterisk informs that exactly this indicator of the page number is assigned to the term "choice" (cf. rule IV).

Let's have a look in turn at the term "possibility" which seems to have three senses that could be differentiated by means of category indicator and diversification of synonyms.

4 Possibility *S*; /= contingency (see further) 68.

5 Possibility *S*; /= being able to act — in the situational sense (see further) 62.

6 Possibility *Tc*; /= being able to act — in the dispositional sense (see further) 62.

7 Being able to act *S*; **(**/ being able completely 66; /**:** the conclusive moment 69; **us**/ circumstances 63; **us**/ the technique of using "being able" 68; **in**/ coming into existence 78,179.

8 Being able to act *Tc*; **cm**/ power, dexterity, knowledge 62; /**:** impulse 64.

In order to identify 5 with 7 and 6 with 8 more easily, it is possible to add

after a dash the expressions from 5 and 6 under 7 and 8, respectively, but it is not necessary because the category indicator allows us to unambiguously establish these assignments. Example 7 means: being able to act is understood here as a state of affairs; its type is being able completely; it is related to the conclusive moment, it uses appropriate circumstances and the technique of using "being able;" its indicator (proof) is when something that is possible comes into existence. Example 8 means: being able to act is understood here as a feature (disposition) of a human being; it is related to impulse; its components are: power, dexterity and knowledge.

Here follow a few further examples whose interpretation should not be troublesome, and which may turn out to be useful material for a critical discussion of the present project.

9 Cooperation *Rc*; /= liaison 93; (/ positive cooperation 93; (/ negative cooperation 93; (/ cooperation between two subjects 97; (/ cooperation between many subjects 97.

10 Positive cooperation *Rc*; /= positive liaison 93; **cm**/ informing 99, managing 99, 105, controlling 100, 105, action plan 98, helping 94, reporting 100; /**:** the aim of action 94; /**:** negative cooperation 261; /**:** team 98, 100.

11 Negative cooperation *Rc*; /= negative liaison 93; /= fight 93, 96, 239; (/rivalry 95; **cm**/ military stratagem 240; **cm**/ attack 248, 259; **cm**/ defense 248, 259; **cm**/ interrupting 95; /**:** positive cooperation 261.

The index's degree of detail can be freely adjusted. For example, the expression "military stratagem" which is a sub-headword in 11, becomes a headword on the list in alphabetical order; then it is possible to be content with noting it down and relating it to the headword "Negative cooperation" by means of the relation /**cm**, however, it is also possible to make a long list of various variants of military stratagems, which in fact can be found in *Praxiology* together with an extended discussion, by means of the relation (/. The decision on the index's degree of detail depends on the index's aim and the author's being able (in the sense of example 7 and 8) to do the index.

4. The problem of the worthiness of the relational index

Are there any reasons in favour of constructing the index in the way which has been outlined above?

An index is a tool of action such as looking for concepts or statements in the text of a book. This tool is needed in a given moment for something. The worthiness of a tool is assessed on the basis of the degree to which it is effective and economic (cf. *Praxiology*, chapter VIII). The more effective an index is the more items it allows to find in the text that are interesting

for us, and the more economic it is, the less time and attention the reader devotes to searching it, and the less space it takes in the book.

The relational index belongs to the index family (3) whose characteristics are its greater effectiveness: it allows us to decide whether a given concept occurs in a relation interesting from our point of view on the basis of headwords themselves, even before checking the text of a book, and in the case when the reader decides that the content of the book is useful, the index refers the reader to the appropriate page. Indexes of the type (1) or (2) applied to single books (though it is different in the case of bibliography index) have an advantage over (3), namely they save the author's time, but it is difficult to see any other advantage. Thus it seems advisable to compare particular variants of type (3) to assess advantages and disadvantages of the relational index.

In index of the type (3b), in which relations are determined by the order of terms in the index entry, the number of relations is small and established (i.e. it is not possible to increase it). Namely, these are relations determined by relations between categories, e.g. the categories *thing* and *process*. Certain things are objects (material), others are subjects, while others are products of various processes. Having established the order, for example such that the name of an object is always first, then the name of the process and the name of a subject (agent) is always third, we shall arrive at an unambiguous description of appropriate relations of the type "x produces y" — in a maximally economic way, without introducing special symbols for relations. However, when other relations (than the ones established by the set of categories) are needed, or when we want to have an open set of relations in order to increase it if need be, we need to give up this method and use one of the remaining ones.

The method of using common language results in a maximal flexibility due to a rich stock of vocabulary at its disposal; it is also less laborious for the author, who does not need to trouble with working on the set of categories and relations, and translating the text into appropriate symbolic notations. Thus if the text is not capable of being translated into set-theoretic concepts and of having its basic relations distinguished clearly, or if time constraints do not allow such an endeavour, then it is better to describe the relations in common language.

What are the advantages of the relational index, then? Due to introducing symbolic markings, it can provide a lot of information taking less space than an index using common language expressions. It is not only about saving paper and the printer's time, more importantly it is about saving time and

effort for the user; for it is quicker to find a thing we are looking for if the searching space is smaller. However, if it were remarked that mastering a special set of symbols different for different indexes would involve separate effort, then the answer is that using the symbols is not necessary to find the page in which the interesting relation between concepts occurs; the fact that the headword is accompanied by a sub-headword indicates that the page number given next to the sub-headword sends the reader to the page which concerns the relation. Symbolic markings will be used by, for example, the reader who wants to learn something about the nature of the relation (about the type of relation between appropriate terms) directly from the index, without searching in the book.

However, for the reader more important than these conveniences are advantages of another nature. While creating a relational index, the author controls the conceptual apparatus of the text. And thus — ambiguities are discovered, which is caused by a necessity to determine a category and a relation of extension equivalence (i.e. a certain type of paraphrasing). Further — potential inconsistencies in using the terminology are shown, and vagueness of the text is spotted if the text does not allow us to decide what type of category or relation is discussed, etc. Thus constructed index is, similarly to a summary, a result of working with the text which reveals its main conceptual relations and possible shortcomings or incorrectness of these relations, but is much more detailed and systematic than any summary. All these may be of help when information on a given work is saved in an information system, e.g. a catalog, bibliography or thesaurus.

Discovering and analyzing these types of relations is a part of an answer to the question about the subject or theme of a work, the answer given with great accuracy, because using set-theoretic concepts involves knowing the content of terms occurring in the text.

This statement is in line with the "official" definition of a book's subject index:

"Indeks rzeczowy — jest to wykaz terminów występujących w książce, przy czym jako temat należy rozumieć nazwę pojęcia występującego w materiale indeksowym, jak: nazwę konkretnego przedmiotu, pojęcia abstrakcyjnego, zagadnienia, dziedziny wiedzy, zjawiska, procesu, osoby, jednostki geograficznej, instytucji, dzieła anonimowego, wydarzenia historycznego" (Stasiewska 1964: 16).[6]

[6]The quoted definition, though its intentions correspond to what is usually called the subject index, may be criticised because of its wording. What is mentioned among concepts "named" by the theme, after the colon are concrete objects, abstract concepts,

(The subject index — is a list of themes occurring in a book. What is understood as theme is a name of a concept occurring in the index material, such as: a name of a particular object, abstract concept, issue, domain of knowledge, phenomenon, process, person, geographical unit, institution, anonymous work, historical event).

The relational index is obviously this type of a theme list, but also reveals something more, namely the net of interesting relations between designates of the themes, and thus characterizes the theme in another sense — the sense which corresponds to the concept of the domain of considerations. This conclusion seems to be grounded in an analysis of the concept of theme conducted by Jerzy Pelc, who distinguishes ten senses of the word "theme" and differentiates them under (5): THEME AS "THIS" THAT IS REPRESENTED IN A WORK (Pelc 1961). The quotation mark around the pronoun *this* is because the author mainly discusses the subject of a literary work, and thus something fictional in nature; then using a demonstrative pronoun, which identifies real objects, is metaphoric, which is marked by the author by means of the quotation mark. When we are interested only in a theme of a scientific work, the quotation mark can be skipped.

With reference to the thus understood theme, the author differentiates two more approaches, from which the former brings us closer to the concept of the domain of considerations.

"Jeśli tematem jest np. przedmiot przedstawiony (temat (5)) pojmowany bardzo szeroko, mianowicie jako ogół rzeczy, postaci, zdarzeń lub stosunków, o których mowa w utworze, to utwór ten będzie jednotematyczny [...] Gdy natomiast pojmować przedmiot jako pewną np. indywidualną rzecz przedstawioną, to tyle można wskazać w dziele tematów (5), ile takich rzeczy ono omawia" (Pelc 1961: 83).

(If the theme is e.g. a represented object (theme (5)) understood broadly, namely as the whole of things, characters, events and relations, which are mentioned in a work, then this work is monothematic [...] When, however, the theme is understood as a certain e.g. individual represented thing, then there

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etc., which implies that a concrete object is also a concept. The mere expression "abstract concept" should be replaced with the term "abstract object." Also, claiming that a term is a name of a concept is unfortunate, since it is commonly accepted (also in common language) to say that a term is a name of its designates, while it expresses an appropriate concept. The reader who has no prior knowledge of logico-semantic terminology may be indifferent to this or that version, but such readers are decreasing in number. It is also of importance here that not understanding logical terminology may be avoided by using appropriate scientific handbooks, however not understanding the terminology created *ad hoc* is incurable.

are as many themes (5) in the work, as many things the work discusses.)

The former understanding occurs in everyday common speech, in the language of essays and academic dissertations, etc., when we ask "What is the theme of the book?" — we expect that the term in the singular will make the answer characterize all issues considered in the work. Exactly an answer is provided in an exhaustive and precise way by the relational index. If the answer seems to be too exhaustive, because sometimes we would like to have a short answer in a few words or sentences, then it is not difficult to obtain a more concise answer by applying the following operation of selection on the index: we find headwords which have the biggest number of relations with other headwords; this is indicated by the number of terms and variety of relations occurring under a given headword. A list of a few such headwords which are "most rich in content" will allow us to obtain shorter characteristics of the work.

Alongside highlighting the role of the relational index as a certain mapping of the domain of considerations, the issue of ordering headwords should also be discussed. A certain partial order can be adopted from the sequence of symbols which characterize a given domain (cf. *D* and *D'* in section 3), then particular groups of themes may be listed e.g. in the order of categories of given terms that has been adopted in this sequence of symbols. Also, other principles of systematic ordering can be found, which would make the index's arrangement reflect the structure of the domain to which it corresponds.

An alternative to this type of method is alphabetical order. Considering the for-and-against arguments in relation to these possibilities, it seems more reasonable to firmly opt for the alphabetical order, which is an extremely significant discovery for improving information processes. If one is interested in the systematic order, it can be reconstructed from the alphabetically ordered index; however, a typical need of index users is the need to quickly find the concept which is of interest to them. In this respect no classification and no partial order, which can be expected from systematic orders, can replace a linear ordering according to a relation which is well-known. It seems that there is no relation fulfilling such conditions, other than the relation of alphabetical sequence.

Perhaps these statements seem obvious, but they are worth repeating, for it happens sometimes that an author does not resist the temptation to systematize within a subject index and creates something which may develop the reader intellectually, but does not speed up or help in finding the content which is of interest to the reader. And in fact exactly these conveniences

decide how useful are information tools, without which we would be lost and helpless in the forest of writing that grows as fast as a tropical jungle.

5. Syntactic and semantic problematic issues concerning the subject index

What differentiates the relational index from other types of the subject index are its characteristic syntactic and semantic properties. The ordering of types of the subject index presented in section 1 is an ordering of an increasing number of semiotic relations within the index itself or the index and the work's text. The relational index is characterized by the greatest "density" of this net of relations.

The simplest index, which is created as a result of coordinate indexing (type (1)), has only one type of relationship; it is the relation of belonging to the context, which occurs between the term-headword and its context indicated by the text passage number (in the work's index) or the document number (in indexes of other types). This syntactic relation is aimed at being an indicator of the semantic relationship between the text and its theme, understood as a domain of considerations or a fragment of such a domain. It is understood, namely, on the basis of the convention determining how the index functions, that the denotation of an index headword is this fragment of the domain to which refers the context which is the second element of the considered syntactic relation.

When we move to an index which includes cross-references under some headwords, we are dealing with yet another syntactic relation, which occurs, in turn, between terms within the index. This relation informs us that there is a relationship (which is not specified) between denotations of the terms: the term which refers the reader to another one, and the term to which the reader is referred.

An index in which the index entry also contains descriptors (subheadwords), introduces yet another type of relation. It is again a syntactic relation which is aimed at indicating relationships between denotations of the expressions, however not between entries but inside the index entry; this method of specifying the relationship is more precise than the one that uses a reference of the type "see further."

The relational index, which is a variant of this most complex type of index, introduces further diversification of relations which involves fundamental concepts of logical semantics; a property of logical semantics is characterizing extra-linguistic correlates of expressions by means of set-theoretic ontological categories, i.e. such concepts as: set, element of the set, family of sets, relation, functions, etc.

These concepts are used with various aims in the theory of the relational index as well as in practical rules of its construction; for example, we shall mention the following applications. One type of ambiguity in natural language is that one expression (in the sense of expression — type, and not expression — exemplar) takes one or another semantic category depending on the context.[7] This phenomenon was well-understood in the medieval theory of supposition which differentiated, among other things, simple supposition (*suppositio simplex*) and formal supposition (*suppositio formalis*). The former consisted in using a term as a name of an individual, the latter — in using a term as a name of a set (the form, i.e. property determines the set, hence even today the adjective "formalis" seems to be accurate). An example of the former may be the use of the words *fox* and *hare* in the sentence *The fox chases the hare*, an example of the former may be the use of the same words in the sentence *The fox and the hare are the species of vertebrate*. Each of the two suppositions, that is (roughly) each way of using these types of terms, assign a different semantic category to the terms, which can be recognized on the basis of context. However, in natural language, depending on context to a great extent means depending on the addressee's guessing capability, for there are no codified rules which concern the relationship between the semantic category and the context. Admittedly, the ambiguity about categories remains unsolved in the relational index, which is caused by the notation economy, but it becomes a systematic ambiguity, that is such for which a structural-descriptive rule is established (which rule refers only to the shape of expressions). The rule allows for infallibly differentiate categories by means of the context. This rule is as follows:

If a term which is a sub-headword is preceded by the symbols of set-theoretic relations /= or /(or their inverse relations, the headword and the sub-headword are in formal supposition, i.e. as names of sets. However, if the sub-headword is preceded by a symbol of whatever other relation (from the repertoire provided in the index instructions), the headword and the sub-headword are in simple supposition, i.e. as names of individual things, events, processes, etc.

Let's consider example 10 in section 3, namely the headword "positive cooperation". The first sub-headword, by means of the symbol /=, informs us that the class of positive co-operations is identical with the class of positive liaisons, which shows that both terms are in formal supposition here. The second sub-headword explains that one of the components (the relation

[7]The problem of changeability in semantic category in natural language is discussed by Pelc (1967).

/**cm**) of positive cooperation is (mutual) informing; obviously, it is not a component of the set but a component in the sense that every concrete process of positive cooperation involves the process of informing; thus we are dealing here with simple supposition.

A separate semantic issue is the relationship of the index as a whole to the whole of the work's text. The problems which arise here are analogous to the ones which arise when considering the relationship between the text and its summary (Marciszewski 2015). An index as well as a summary are a certain transformation of the text, which are governed by two directives: a) to show as much information of the original text as possible, b) to make it as short as possible. Thus of two equally concise summaries, the one that transmits more information of the original text is better; of two equally informative summaries, the one that is more concise is better. The same criteria need to be applied to indexes. In the previous section an attempt was made to show that the relational index fulfils the above criteria to a great degree. However, it is difficult to make the considerations about this matter more advanced than just quite general drafts, as long as there is no definition of a well-grounded concept of semantic information. There are attempts to make the concept more precise, however the application of their results is so far only possible in very simple languages, much simpler than a language of whatever scientific text (Hintikka 1968). As long as the research on semantic information and on appropriate languages is not advanced enough so that the theory of semantic information cannot enter into the everyday repertoire of the science on scientific information, we need to restrict ourselves to draft solutions and postulates. It is by no means a fruitless enterprise, for it makes theoreticians of semantic information remember that there is an urgent social indent.

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STATISTICAL INFORMATION

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The term "information" has been made into a carrier in the last few years, replacing many different words, such as: "communication," "message," "report," "results," "announcement," "content," "meaning" and others in the natural language. This term has been, and still is, used also in the language of science; in particular it has been introduced to the language of the statistical communication theory.

In the years 1928-1948 American engineers and mathematicians started to use the expression "information theory" instead of "communication theory," understanding this term approximately and unclearly as a theory, whose basic formula was the function introduced by R. Hartley $H = \log_2 m$, where m means the number of equally probable conditions. R. Hartley, in his work *Transmission of Information* (Hartley 1928) does not in fact use the expression "information theory," but operates with such words, as: "measure of information," "amount of information" and "information content." These attempts at promoting a new term might have gone unnoticed, if it had not been for the publicity won by the work of C. E. Shannon and W. Weaver *The Mathematical Theory of Communication* (Shannon, Weaver 1949), published in 1949 and the rapid developments in the field of mathematical machines.

Claud Edward Shannon, an American mathematician, employed since 1941 in the Bell Telephone Laboratories, studied the optimal conditions of the transmission of communications. As a result of his experiences, he found it convenient to introduce a formula for calculation of a certain value, which Shannon called the amount of information. This term caused considerable confusion, since it brought to mind the suspicion that what Shannon was measuring was information. There arose a conviction that the

term "information" is clear and plain, that data were its denotations, since it was possible, if needed, to provide a numerical value thereof. And this, in turn, legitimised the use by various occasions of the term "information," as a well-defined term.

In order to assess the abovementioned misunderstanding more clearly, we will try to trace the steps by the stem of the basic notions, which were the basis for Shannon's introduction of the function of the "amount of information."

The matter of the costs of transmissions made telegraphically, over the radio or by telephone has played a major role in the processes of communication. Reduction of these costs was considerably facilitated by the application of the results of statistical research of language. A pioneer in the field of studying the frequency of language elements was, as Bertil Malmberg claims (1969), a Swedish linguist called Adolf Norren. The first enthusiasts of the statistical study of language also included G. K. Zipf, who in *Relative Frequency as a Determinant of Phonetic Change* (1929) and in many later works, presented a series of general rules of the frequency of language elements. Also known are the works of Soviet researchers in this field, i.e. the works of Andrey Kolmogorov.

The statistical study of language made it possible, for example, to determine the frequency of appearance of particular letters in the texts of a given language, which made it possible in turn to apply, by transmission of text, the shortest signs for letters most frequently appearing in a long series of signs.

The probability theory was also applied in the calculations. This theory proved useful for the examination and description of certain regularities in the scope of random events, which could also be called chance and unsystematic events. The notion of a random event and of probability are presently described in the aforementioned theory as postulates. They are the theoretical equivalents of chance events and statistical frequency. By consideration of Shannon's formula, it is not necessary to use the vague notion of statistical frequency, which the author has applied, since this is not a notion separate from probability, but only a practical equivalent thereof.

By means of a gross simplification, the notion of probability can be applied as follows: let us consider set U, the largest set, which we are to consider. This is the so-called set of elementary events. The sub-sets of U, random events, or events in short, shall be marked as A_1, $A_2 \ldots$

If each event A is ascribed exactly one number $P(A)$, such that:

1. $O \leqslant P(A) \leqslant 1$

2. for each pair of disjunctive events A_i, A_j:
   $P(A_i \cup A_j) = P(A_i) + P(A_j)$, $i \neq j$
3. $P(U) = 1$

then we say that probability determined on events A_1, $A_2 \ldots$ and the number *P(A)* is called the probability of event A. In other words, probability is a function, whose values are real numbers, and whose arguments are events A, and which meets the conditions (1), (2), (3).

In practice, for specific calculations one often uses the statistical probability formula $P(A) = \frac{n}{m}$, where n is a number of elementary events which event A falls into, and m is the number of elementary events of a specific set U.

By solving telecommunication problems, it proved more comfortable to use not the probability function, but a logarithm of the reciprocal thereof (the symbol "ln" means a natural logarithm):

$$\mathrm{I} = \ln \tfrac{1}{P(A)} = — \ln P(A)$$

Shannon introduced function I, presenting his famous formula:

$$\mathrm{I} = - K \textstyle\sum_{i=1}^{m} p_i \ln p_i$$

where K is a certain constant (determined depending on the fact of what unit system we want to adopt); m — the number of elementary events; $p_i (i = 1 \ldots m)$ the probability calculated for each of the random events, whereby $p_1 + p_2 + p_m = 1$.

This formula was used to calculate the average amount of information, ascribable to each letter. Function I was called the amount of information. For example, the amount of information, or to be more concise, information, contained in a word composed of G letters is equal to:

$$\mathrm{I}_G = I \bullet G = - GK \textstyle\sum_{i=1}^{m} p_i \ln p_i.$$

If $p_1 = p_2 = ... = p_m = \frac{1}{m}$, i.e. if each of the elementary events is equally probable, then the amount of information

$$\mathrm{I} = — K \ln \tfrac{1}{m} = K \ln m.$$

For measurement of the amount of information Shannon used *nit*(natural unit). 1 *nit* was the amount of information, when the probability of the event was equal to $\frac{1}{e}$. Presently, one uses logarithms with 2 in the basis and

a comfortable system of units, the so-called *bits* (*binary digits*). The amount of information when the probability of the event is equal to $\frac{1}{2}$ amounts to 1 bit.

A transmission from natural logarithms *ln* to logarithms with a 2-base ($\log_2$) requires multiplication of all these logarithms by the same number (transition mode), which in this case is equal to ln 2.

$$\ln\ m = \ln\ 2 \bullet \log_2\ m$$

If we assume that $K = \frac{1}{\ln 2}$, formula $\mathrm{I} = K\ \ln\ m.$ shall have the following form

$$\mathrm{I} = \tfrac{1}{\ln 2}\ \ln\ 2\ \log_2 m = \log_2 m.$$

If $m = 2$:

$$\mathrm{I} = \log_2\ 2 = 1$$

In such specific units one is able to calculate information ascribable to e.g. one letter of the alphabet. The English alphabet has 27 characters (26 letters plus space). If all these characters were equally probable, then it would be possible to say that the amount of information contained in one letter is equal to $\mathrm{I} = \log_2 27 = 4.76$ bits per letter. In common language one interchangeably uses the descriptions "a letter of the alphabet carries 4.76 bits of information" or "a letter of the alphabet contains 4.76 bits of information."

Since, however, probabilities for particular letters vary, they are determined experimentally, and then, according to Shannon's mode, one determines the average amount of information ascribable to one letter; in the English alphabet it is equal to 4.03 bits. The actual number of bits ascribable to particular letters are lower. The number 4.03 is the upper limit of the amount of information ascribable to one letter (Brillouin 1969: 26-31).

The term "amount of information" or the interchangeably used term "information content" is used to determine the function (in Shannon's case) ascribing to a series of letters a certain number, for example ascribing to a series composed of one hundred words a number, whose value depends on the fact, whether such series constitutes a chaotic sequence of signs or sentences of a full of content, important, scientific paper.

Realisation of this fact makes it easier to let go of the suggestions brought by the word "information" and makes it possible to understand that in the

case of the information theory the sense of this word is specified by a formula and the postulates of the probability theory. Each function which meets the abovementioned conditions, constitutes information.

One may be tempted to interpret the formula and function I in accordance with the terms used in practice of statistical research. If we interpret the probability function as a statistical frequency, then function I = — ln $P(A)$ may be interpreted as a degree of uncertainty. J. Bar-Hillel (1964) suggests the term rarity in the sense of extraordinariness, scarcity. An interpretation of this kind seems to be justified to a certain extent in view of language judgement, since the greater probability of occurrence of a given letter in a text, the smaller the degree of uncertainty of its occurrence. In marginal cases, when the probability has the value of 1, i.e. when we are dealing with certainty, occurrence of a given letter is fully certain — the degree of uncertainty is equal to zero.

Function $P(A)$ may assume numerical values from the range (0,1), function I may assume values from the range $(0, +\infty)$ of real numbers. If the probability goes to zero, the level of uncertainty increases to infinity. It is also consistent with the common understanding: the smaller the probability of a letter occurring in a text, the greater the degree of uncertainty, to put it in other words, one is less likely to expect it. For example, the probability of a Chinese word in a Polish novel is close to zero, and therefore the degree of uncertainty is so high, that it is difficult to expect that one will come across such a word. If we replace "the degree of uncertainty" in this sentence with an equivalent expression, i.e. with "the amount of information," we will end up with the following sentence: the probability of a Chinese word in a Polish novel is close to zero, and therefore, the amount of information is so high, that one can hardly expect that one will come across it. It is also possible to say: the smaller the probability of occurrence of a given letter in a text, the greater the amount of information that this letter carries.

These sentences, although totally equivalent to the former sentences, seem shocking.

Summing up: the term "information" does not mean anything which we could call the semantic content of expressions. One might say that in communication theory one considers statistical information only. There has been and still is an attempt to use the notion of probability and information in epistemology. Works on this topic were published by K. Popper, R. Carnap, Y. Bar-Hillel, and earlier by Donald Mac Key, Jean Ville, and later by C. G. Hempel, H. Kyburg, J. Geod and others. The list of researchers is quite long. The notion of information turns out to be quite useful by analysis of the so-

called inductive proceeding, sometimes also referred to as inductive reasoning, which is in the centre of the attention of contemporary logicians, psychologists, sociologists and economists. Attempts at defining "information" from this point of view may be found in the works of J. Hintikka (1968: 311-331, 1966: 96-112). This final list of names is to serve only as a signal that the problem of application of the probability theory to language research is still open.

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A FORMAL AND SEMANTIC ANALYSIS OF POLISH PRE-SENTENCE AND INTER-SENTENCE CONNECTIVES AND RELATED WORDS[1]

Originally published as "Formalna i semantyczna analiza polskich spójników przyzdaniowych i międzyzdaniowych oraz wyrazów pokrewnych," Studia Semiotyczne 3 (1972), 109–144. Translated by Joanna Guzowska

The connectives featuring in propositional calculus as well as other richer logical calculi are called SENTENTIAL CONNECTIVES in English and, perhaps more aptly, SENTENTIAL FUNCTORS in Polish. They are: negation (symbol: $\sim$; read as "not"), disjunction ($\vee$; read as "or"), conjunction ($\wedge$; read as "and"), implication ($\rightarrow$; read as "if... then..."), and equivalence ($\leftrightarrow$; read as "if and only if"). The Polish term reflects their function better than the English one since, first of all, negation is a single-argument functor and thus does not connect anything (which is suggested by the term CONNECTIVE), and secondly, equivalence is functionally highly specialized and it would be difficult to treat it as a connective in a natural language. Hence, only three of the five functors listed above are more or less equivalent to natural language connectives, including implication whose use in

[1]Since the following analysis is concerned with the use of connectives in the Polish language, the relevant connective words and expressions are left untranslated, with English equivalents supplied in brackets. The latter are meant to give the reader a rough idea of the meaning of the given connective. They are approximations rather than perfect translations. In particular, the meaning of certain constituents of multi-word connectives and their partial overlap in various connective expressions is bound to be lost in translation, although it can be observed in the original phrasing — trans. note.

the propositional calculus, as is well known, differs significantly from the expression "if... then..." found in the vernacular.

This modest set of five *quasi*-connective functors has turned out to be a sufficient foundation, in the propositional calculus as well as other logical calculi which contain it, for much more complex systems (there have also been attempts to enrich the very system of propositional calculus functors by creating various systems of modal logic, which nonetheless did not undermine the primacy of classical logic).

As is rather well known, some of the functors mentioned above can be defined with the help of some other. Moreover, there exist two additional functors, other than these five, each of which suffices to define those five sentential functors. In practice, the five are used because they yield themselves at least partly to a natural language interpretation — here the issue of whether some of them should be treated as primitive terms or whether they should all be seen as definitional abbreviations is insignificant.

In natural languages — in this case Polish — the number of pre-sentence and inter-sentence connectives is far greater than five and they reflect far more complex relationships among sentences. Logical connectives (sentential functors) thus turn out to be an insufficient tool insofar as the interpretation of natural language connectives is concerned. There have been attempts to interpret the latter by means of more precise concepts. However, as we shall see based on an example, these concepts can hardly be viewed as logical. For the Polish language, an attempt of this kind has been made, among others, by Tadeusz Kotarbiński in his *Elements* (1961).

"Next come connectives which in principle no longer belong to the formulae of the propositional calculus. This is because their use is characterized not only by the way in which the truth value of the whole sentence construed by linking its clauses with such a connective depends on the truth value of the clauses themselves ('p or q' is true if at least one element is true; 'p and q' is true if both elements are true, etc.). Other factors, different for various groups of connectives, come into play as well. Let us consider such connectives as 'chociaż [although]' or 'jednak [yet]' and 'ponieważ [since]' or 'więc [thus]'. Regarding 'chociaż [although]', the following definition may not encounter too much resistance: 'p, although q' says as much as: q and p and the fact that q raises a reasonable suspicion that not p. For example, *John likes Sophie, although Sophie is John's stepmother* says as much as: *Sophie is John's stepmother* and *John likes Sophie* and the fact that Sophie is John's stepmother raises a reasonable suspicion that it is not true that *John likes Sophie*. Regarding the expression 'wprawdzie... jednak... [admittedly...

yet...]' we can formulate the following definition: 'Wprawdzie [admittedly] p, jednak [yet] q' says as much as: p and q and the fact that p raises a reasonable suspicion that not q. It turns out that having substituted 'p, chociaż [athough] q' or 'p, jednak [yet] q' with an appropriate definitional equivalent we find in the new formula words like 'raises' or 'suspicion', which is unacceptable insofar as formulae of the propositional calculus go. [...] As to expressions such as 'ponieważ... przeto... [since... then...]', there is apparently no room for them in the propositional calculus since they do not seem to yield a whole which may be true or false, that is, they do not yield a sentence in the logical sense of the term. What they yield is an expression of some kind of logical reasoning or proof. Reasoning and proof can be correct or not, yet they cannot be true or false. On the other hand, any formula of the propositional calculus after sentence variables have been substituted with sentences should become a sentence, that is, an expression which is true or false. The fact that the propositional calculus is not concerned with the connectives I have just mentioned certainly does not weaken their pretense to being accounted for by some part of formal logic. Hopefully, this will happen as soon as is possible" (1961: 210).

As far as the first example goes, one may well agree with Kotarbiński with regard to both his points: the meaning of the connective CHOCIAŻ [although] is reconstructed correctly but the form of this interpretation does not allow for strict formal rendering. As far as the second example is concerned, the analysis of natural language connectives, as will be shown below, does go beyond the logical calculus.

It may be worth mentioning that the connectives of the propositional calculus, by the nature of the latter, meet the criterion of extensionality. This means that the logical value (truth or falsity) of any given correctly constructed formula (an appropriate sequence of sentences linked with a connective) depends exclusively, given the connective present in that sentence formula, on the logical value of the constituent clauses and not on their meaning. As will become apparent below, the connectives of any natural language, in this case Polish, are not only intensional, which means that the substitution in any given correctly constructed sentence formula of one clause by some other clause of the same logical value may change the logical value of the formula as a whole. In addition, the correct (meaningful in light of the rules of the Polish language) use of connectives poses various limitations on which sentences can be linked with them — limitations which are often semantic. Moreover, the choice in this matter may impact the interpretation of the meaning of the given connective in the given case. The

following analysis of such connectives as ALE [but], BO [because] and I [and] will make the last remark clearer.

Given that there is no precise analysis of the function of various connectives in the Polish language, the goal of this paper is to propose one such analysis using an apparatus which is as strict and conducive to formal interpretation as possible. As it will turn out, the obtained results do not yield a logical calculus. This is undoubtedly due to the fact that the formal apparatus applied in this analysis is heterogeneous (see below) and combines — as the studied material requires — elements of logical calculi (including set theory) and probability theory. However, it seems that the method proposed here can facilitate the automatization of certain interpretations of Polish connectives.

One significant qualification is on order at this point. The Polish connectives discussed here have been chosen as a matter of convention. Traditional grammars do not offer a full list of Polish sentential connectives and the most recent dictionary of the Polish language (Doroszewski 1958—1969) almost programmatically refuses to assign the appropriate part of speech in cases which are difficult or controversial[2]. As a result, the subject-matter of this paper are words and expressions assumed to be connectives. However, the decision to treat any given word or multi-word expression as such does not readily contravene the traditional view, at least not most of the time. Importantly, it has proven necessary — as is reflected in the title of this paper — to analyze not only inter-sentence connectives, that is, connectives par excellence, but also certain words and expressions here referred to as pre-sentence connectives whose role is to modify individual sentences and not to link them. As can be seen from the above discussion, the analysis involves single-word connectives as well as multi-word expressions.

The conceptual apparatus employed in this paper and its respective symbolism are the following:

1. Commonly assumed logical concepts: propositional calculus functors mentioned in the introduction; quantifiers ($\forall$, $\exists$), including those of limited range; elementary notions of set theory (along with the appropriate symbolism); notions of identity and non-identity ($=$, $\neq$).

2. Predominantly, although not exclusively, extra-logical concepts required for the purposes of this paper. These concepts do not require any extended explanation, although an exposition of the relevant symbolism and a few other comments are in order.

[2]Compare the characterization under CHYBA [likely].

(a) Sentences are here treated as functions with a finite number of arguments $p = (f(x, y, \ldots, z)$ wherein the functor f is interpreted as the predicate, while the arguments are the subject(s), object(s), adverbial(s), etc. (according to traditional terminology). This interpretation is meant to reflect the currently dominant view that the predicate, usually represented by a verb, is the key component of the sentence overriding the other important components here treated as arguments. (The internal structure of the latter, including the question of whether the subject is a single word or a multi-word expression, is ignored; we are thus not interested in the relationships between the constituents of multi-word arguments.) In some cases, where the goal is to bring attention to some particular argument, for instance in order to contrast it with an analogous argument of some other structurally analogous sentence (see examples below), we will write p_x, p_y, etc. It will also prove convenient to mark, in the form of subscript, certain features of the predicate, for instance p_{fut}, p_{past}, p_{pres} for tenses, or p_1 and p_2 for grammatical persons — here the lack of subscript marks the most neutral third person predicate, or that the person of the predicate is irrelevant in the given context. The analysis carried out in this paper concerns predominantly declarative sentences but may occasionally involve an exclamation or a question, marked respectively as $p!$ and $p?$. These symbols are always placed to the right of the sentence variable. The symbols placed to the left of the sentence variable indicate the logical value of the sentence. As a rule, all past and present declarative sentences mentioned in the paper are treated as true. Moreover (see the remarks on the structure of the latter part of the paper below), any sentence with the symbol of negation, for example $\sim p$, is treated as false in the sense that p is considered to be false, and $\sim p$ to be true. Any sentence whose logical value is indeterminate (since the event which that sentence is about has not happened yet but is considered to be possible) is marked as $?p$. This is in keeping with Aristotle's remark regarding sentences about possible future events recalled recently by Łukasiewicz. The introduction of this concept and its corresponding symbol are necessary here since, as will be shown, some connectives differ in their formal interpretation in precisely the fact that in one case the argument is a sentence with a determinate logical value, while in another case the logical value is indeterminate (see below).

(b) The symbol $\mathrm{P}(a)$ marks the probability of the truth of a, where a is a correctly constructed sentence formula of the propositional calculus. In practice, a will most often be a single sentence variable, negated or not, or a conjunction of two sentence variables one of which may be negated. The probability we take into account here differs from the mathematical or

statistical probability and approximates the notion of subjective probability currently often studied in psychology[3]. These probabilities can assume real values in the closed interval between 0 (impossibility) and 1 (necessity). P(a) can be compared with some real number contained in that (closed) interval, for example $\mathrm{P}(a) > \frac{1}{2}$, or with the probability of the truth of another sentence formula, for example $\mathrm{P}(a) > \mathrm{P}(b)$. The values 0, $\frac{1}{2}$, and 1 are treated as special, which is easily explained in light of the elementary probability theory. Moreover, in some cases it seems to be meaningful to compare the probability of the truth of the given sentence formula (often in a form reduced to a single sentence) with some value n selected from the interval [0, 1]. The value of n is to be selected depending on the meaning of the sentence formula serving as a in P(a). It may sometimes be convenient to supply the 'greater than' and 'lesser than' symbol with an additional exclamation mark (!) or question mark (?). !> should be read as "significantly greater than" and ?> as "slightly greater than," and the same goes for the 'lesser than' symbol.

(c) The symbol T (p, q) should be read as: the sentence p refers to an event antecedent in time with respect to the event described in q. The expression T (p, q) is treated as a correct sentence formula which can thus be negated, ascribed a probability of its truth, etc. Much like in the case of (b) above the point is the probability of the truth of sentences or correctly constructed sentence formulae and not the probability of the occurrence of certain events (to which these sentences or sentence formulae refer), here too, the relation T obtains between sentences and not between events. The goal of this interpretation is to limit the analysis to sentences and thus to avoid the confusion which would ensue if the subject-matter oscillated between sentences referring to events and events themselves. Besides, such an interpretation with regard to the relation T is additionally supported by the fact that in some languages there exist rules for tense sequence — rules which are linguistic and thus applicable to sentences, although they are not unrelated to the relationships which hold between the events such sentences refer to. The relation T also allows us to define, with the purpose of abbreviating some of the notation, a relation S which can be characterized as the relation of synchronicity:

$$S(p,q) =_{df} p \wedge 2 \wedge \sim T(p,q) \wedge \sim T(q,p)$$

[3]For Polish language literature on subjective probability see J. Kozielecki, *The Psychology of Pre-Decision Processes* (1969) and the bibliography of the subject provided therein.

(d) The symbol L (p, q) should be read as: the sentence q can be inferred from the sentence p as its consequence (in the sense introduced by Tarski) according to the rules of the given language (in our case Polish) and given the definitions (in the given language) of words occurring in p. The meaning of the sentence p, if need be, can be rendered more precise by reference to its context, although such cases will not be considered here. In light of what has been said so far, the sentence *Kowalski has been to Zakopane* is a linguistic consequence of the sentence *Kowalski returned from Zakopane* owing to the definition of the word *return* (taken in its non-metaphorical sense). Similarly, the sentence *Kowalski wrote a fourteen-verse poem in iambic pentameter characterized by such and such rhyme scheme* is a linguistic consequence of the sentence *Kowalski wrote a sonnet* due to the definition of the noun *sonnet*. The conception of the linguistic consequence of a sentence appeals directly to Irena Bellert's idea to interpret the meaning of a sentence as a set of its consequences[4]. The boundary between inferring the consequences of a given sentence on a purely linguistic basis (based on the knowledge of the language) and doing so based on the knowledge of the extra-linguistic world (which is always connected with the knowledge of the given language) is difficult to draw. In this paper, we will limit ourselves to the most unambiguous cases possible and in the more ambiguous ones, we will indicate the points which may raise doubt.

(e) The symbol +, where it precedes an example sentence in Polish, indicates that the sentence is not accepted as correct.

(f) The notation of certain relationships between sentences in the surface structure.

(g) The relationship between the independent and the dependent noun clause is indicated using the usual notation for a function $p(q)$ where p indicates the independent clause and q the dependent clause. Here we are interested exclusively in sentences with a preposition as well as preposition-less sentences which are specific transformations of sentences with a preposition. In the Polish language, if the subjects of p and q are different, they must both remain, as in *Kowalski would like his daughter to be happy*. However, if the subject is the same, the sentence *Kowalski would like Kowalski to be happy* takes the form *Kowalski*

The matter gets complicated once we move on to the logical interpretation of sentences of the type $p(q)$. On the grammatical interpretation, both p and

[4]This idea is expressed in her habilitation thesis *On the Logical-Semantic Structure of Utterances* (1972), among other works.

q are sentences — p is the independent clause and q the dependent clause — and the whole $p(q)$ is a compound sentence. On the logical interpretation, on the other hand, q is a sentence which here plays the role of an argument, while p is a single-sentence-argument sentential functor; the whole is a sentence. Since on this interpretation p is not a sentence, it is not possible to assign it a truth value.

From the point of view of the logical interpretation, in most cases — that is, for most substitutions of p and q — the logical value of q does not impact the logical value of the whole: the sentence *Marry told me that Sophie got married* is true if Marry indeed told me so, regardless of whether it is true that Sophie got married or not.

However, for some verbs featuring in the independent clause p (on the grammatical interpretation), or constitutive of the sentential functor p (on the logical interpretation), the whole $p(q)$ is true only if q is a true sentence:

$$(1) \qquad \sim (q \in V) \Rightarrow \sim (p(q) \in V)$$

where V is the set of all true sentences, which in turn yields the following formula for this group of cases:

$$(2) \qquad (p(q) \in V) \Rightarrow (q \in V)$$

Verbs featuring in such cases in the sentential functor p (that is, in the independent clause p on the grammatical interpretation) include: *to know that*, *to be aware that*, and *to realize that*; *to be aware that* is treated semantically as a verb here, although its structure would be traditionally interpreted in a more complicated way. On the other hand, as we will see, *to know whether* does not belong to this category. The category also includes the verbs *to manage to* and *to succeed in* whose common semantic characteristic is that they indicate some kind of achievement or success. If it is true that *Kowalski managed to defeat his opponent*, it is true that *Kowalski defeated his opponent*. It seems that in these cases p and q always share the same subject (on the grammatical interpretation), which is why such sentences take on a contracted form, much like *Kowalski would like to be happy*.

In light of current research on sentence transformations in the Polish language, it seems to be advisable to stop at that remark. In practice, we will use the notation proper for group (1), and $p(q)$ will be used specifically for such sentences with a proposition as: p ŻE [that] q, p CZY [whether] q, and p ŻEBY [to] q. It seems that each autonomously loose sentence (according to the terminology introduced by Klemensiewicz) can stand in the position of q

in $p(q)$, while p can only be a sentence with a verb belonging to verba dicendi, sentiendi, and conandi. Such sentences, in turn, cannot be autonomously loose. In some cases, the ambiguity of verbs seemingly contradicts this rule, as in: *I see that Kowalski is writing* and *Kowalski is writing that his daughter got married*. However, in the first example *to write* = "to perform the manual activity of writing," while in the latter, *to write* = "to convey information in a written form." We thus assume that *to write* $\neq$ *to write* ŻE [*that*]. Here, we do not analyze more complex sentences of the type $p(q(r))$, for example: *Kowalski is writing that he would like his daughter to get married*.

For connectives other than ŻE [that], CZY [whether], and ŻEBY [to], the surface structure will be given as C p, p C (the latter is rare and stylistically thick as in: WATCH OUT THEN), p C q, and C_1 p C_2 q (where both $C_1 = C_2$, as in the case of ANI... ANI... [neither... nor...] and $C_1 \neq C_2$, as in the case of JEŻELI... TO... [if... then...] are possible). In the Polish language there occur in some cases alternative constructions with multiple positioning of the connective possible of the type p C_1 q = C_1 q (C_2) p, where C_2, often TO [then], is optional, for example: p PONIEWAŻ [since] q = PONIEWAŻ [since] q (TO [then]) p.

3. Apart from that, the following limitations on variable substitution need to be noted. These limitations go beyond the rules of variable substitution typically assumed in logic. Both in the case of sentences of the type $p(q)$ and those of the types p C q and C_1 p C_2 q, we assume that $p \neq q$ and thus that the two variables stand for two different sentences in Polish and that, in consequence, one cannot substitute p for q or q for p in any given example. This is in accord with usual linguistic practice — ways of speaking which breach usual linguistic norms (facetious, metaphorical, etc.) will not be analyzed here with the exception of several sentences clearly marked as such. We also ignore in our notation the fact that the connective is sometimes built into the sentence instead of preceding it, for example when it follows the subject: *Mary will* CHYBA [*likely*] *pass the exam*.

We would like to precede the following maximally exhaustive analysis with some remarks regarding ŻE [that], CZY [whether], and ŻEBY [to]. These connectives do not lend themselves easily to a precise analysis using the apparatus described above since their function in the Polish language is mainly superficial while their semantic role is barely marked. Hence the same formal notation for all three cases: $p(q)$. That the role of these connectives pertains to the surface structure of the language is evidenced by the fact

that, unlike other connectives characterized by a clearly marked semantic function most of which possess relatively close equivalents in other languages, ŻE [that], CZY [whether], and ŻEBY [to] do not have such equivalents. A comparison with the English language, for example, shows that the English constructions equivalent to the Polish ones are often, if not predominantly, entirely different. An even starker divergence in the surface structure can be observed when Polish is compared with Mandarin Chinese, where the constructions equivalent to the use of these connectives in Polish are utterly dissimilar.

In some constructions CZY [whether] and ŻEBY [to] are at least partly interchangeable with ŻE [that]. Let us consider the following examples:

(3)
a. I know ŻE [that]... I do not know CZY [whether]...
b. I remember ŻE [that]... I do not remember CZY [whether]...
c. I am certain ŻE [that]... I am not certain CZY [whether]...
d. I do not doubt ŻE [that]... I doubt CZY [whether]...

These examples are no doubt in accord with the common usage of ŻE [that] and CZY [whether] and they illustrate this interchangeability. At the same time, the example (3d) shows that what is at stake is not the superficial connection between ŻE [that] and the affirmative form and CZY [whether] and the negative form. Instead, ŻE [that] is used when the verb indicates a state on the part of the speaker, or whoever else is in question, of being adequately informed or convinced (the third person examples would be analogous). CZY [whether], on the other hand, is used when the predicate indicates a lack of information or conviction. The use of ŻE [that] and CZY [whether] is thus conditioned semantically. However, the matter is not that simple and the use of these connectives is much more complex: it is completely in accord with common usage to say, for instance, *I know* CZY [*whether*]..., *I doubt* ŻEBY [*that*]..., etc. The source of the complication is the fact that, as we will see shortly, due to the semantic conditioning mentioned above, the use of these connectives is also impacted by the grammatical person of the subject as well as the tense of the predicate. Let us consider the following examples:

(4)
a. I know CZY [whether] there are lemons in the Deli.
b. I know ŻE [that] there are lemons in the Deli.
c. I do not know CZY [whether] there are lemons in the Deli.
d.+ I do not know ŻE [that] there are lemons in the Deli.

The sentence (4d) is not acceptable. The point is that ŻE [that] and CZY [whether], when used together with *to know*, indicate how well informed the subject of the independent clause is, the difference being that CZY [whether] leaves the content of the given piece of information unspecified, while ŻE [that] discloses that content. (4a) says that I am informed as to there being, or not, lemons in the Deli at a given moment, while (4b) further informs which of the two possible states of affairs is true. (4d) is unacceptable precisely because in the independent clause I deny the possession of the information which I disclose in the dependent clause. We ignore the specific use of *I do not know* in sentences such as *In case of an inspection I do not know that you are not at the office* since here *I do not know* means as much as: "I pretend (or will pretend) that I do not know; I do not own up to this knowledge in light of the possible administrative or legal consequences)," etc.

The situation changes once we transition to the third person:

(5)
a. Kowalski knows CZY [whether] there are lemons in the Deli.
b. Kowalski knows ŻE [that] there are lemons in the Deli.
c. Kowalski does not know CZY [whether] there are lemons in the Deli.
d. Kowalski does not know ŻE [that] there are lemons in the Deli.

Here (5d) differs from (4d) in a significant way: whereas in the case of (4d) the speaker is the same person as the one indicated in that sentence, in the case of (5d) they are different: the unspecified speaker and Kowalski to whom (5d) refers. (Both in general in this paper and in this particular example we ignore the facetious way of speaking where Kowalski would speak of himself in the third person.) This is why there is no self-contradiction here, unlike in (4d). (We also ignore such stylistically loaded uses of *to know* as in *Kowalski knows well* CZY [*whether*] *he deserves a raise or not* since that sentence means "Kowalski knows well ŻE [that] he does not deserve a raise" and thus, quite against the appearances, it is a semantic equivalent of (5b) and not (5d)).

The situation also changes once we stick to the first person but switch to the past tense:

(6)
a. I knew CZY [whether] there are lemons in the Deli.
b. I knew ŻE [that] there are lemons in the Deli.
c. I did not know CZY [whether] there are lemons in the Deli.
d. I did not know ŻE [that] there are lemons in the Deli.

(The tense of the predicate in the dependent clause may be changed to the past without any impact on the course of the analysis. The same goes for the examples given in (4) and (5).) Here the speaker is the same person as the one referred to in the independent clause but there are two different states of being informed: the past state indicated in the independent clause and the present state concurrent with the utterance of the sentence. This is why there is no self-contradiction here.

The connective ŻEBY [to] allows for at least two different interpretations stemming from its usage. The first may be called intentional: "I would like ŻEBY [to]... ," "I am trying ŻEBY [to]... ," "I am doing my best ŻEBY [to]... ," etc. The second interpretation may be characterized as dubitative: "I do not think ŻEBY [that]... ," "I doubt ŻEBY [that]... ," etc. The difference is difficult to pinpoint since the meaning of this connective in any given case depends on the meaning of the verb serving as the predicate in the independent clause. For this reason, the attempt at a formal analysis of the function of this connective fails since formal analysis can make no appeal to meaning in context. Be that as it may, when we compare *I doubt* CZY [*whether*] *he acted that way* and *I doubt* ŻEBY [*that*] *he would act that way*, it seems that the use of ŻEBY [that] emphasizes doubt on the part of the speaker more strongly than the use of CZY [whether] does. Moreover, in a modified version of (4d), whereas it is unacceptable to say + *It is not known to me* ŻE [*that*] *he acted that way*, it is possible to say *It is not known to me* ŻEBY [*that*] *he acted that way*. The juxtaposition of ŻEBY [that] and CZY [whether] in the first case and ŻEBY [to] and ŻE [that] in the latter case does seem to stress the dubitative flavour of ŻEBY [to/that]. The analysis of ŻEBY [to/that] is further complicated by the fact that it is also used in the sense of GDYBY [if]; the difference is even more blurry since the second element of the compound connective ŻEBY... TO BY... [if... then...] is often dropped in the vernacular: ŻEBY(M) [*If*] *I had slightly more money, I would buy myself a cassette player*.

* *
*

The following detailed formal analysis of the selected connectives is graphically arranged like this: the connective itself, written in block letters, is given at the centre of the column; below, on the left side of the column, the position of the connective in the sentence or with respect to the sentences it links is indicated; on the right side of the column, examples are given and

below each example, the proposed formal notation; further comments or interpretations, if there be any, run across both sides of the column.

The examples marked as SJP, where the letter symbol is followed by a Roman and an Arabic number, come from *Słownik Języka Polskiego* (Doroszewski 1958—1969).

	A
p A [and] q	*Kowalski does the long jump,* A [and] *Kwiatkowski does the hurdles.*
	It is nice in Warsaw, A [and] *it is raining in Zakopane.*
	$p_x \wedge q_y \wedge (x \neq y)$

The role of A [and] here is very close to that of I [and], the difference being that it links mutually opposed sentences with different subjects (example 1) or subject-less sentences which are opposed to each other on account of some particular circumstance (in example 2 it is location).

	A
p A [and] q	*You could be the boy's mother,* A [and] *you want to marry him* (SJP I 2).
	q CHOCIAŻ [although] p.
p A [and] q	*I will tell you their secret shortly,* A [and] *your hair will stand up from fright* (SJP I 2).
	$P_{fut} \overset{o}{\Rightarrow} 2^5$.

In some languages, for example in English, the distinction between A [and] and certain uses of I [and] operational in Polish is absent. Compare also A NIE... [and not...]; TO... A NIE... [it (is)... and not...]. As to the accessory A [and], compare the accessory I [and].

The choice of an interpretation of A [and] in a given case is conditioned semantically since it depends on semantic relationships (and not on the relationship of linguistic entailment) between p and q. This circumstance makes automatic interpretation of this connective difficult.

[5]The symbol $\overset{o}{\Rightarrow}$ marks strict implication. The introduction of modal functors is made possible by the introduction of the notion of necessity (see p. 113).

A DOPIERO POTEM [and only then]

p A DOPIERO POTEM [and only then] q	$T(p,q) \wedge (P(T(p,q)) < P(T(q,p))$

If p and q refer to events which have already happened, the entire interpretive formula can be preceded by the conjunction $p \wedge q$.

It seems that the expression discussed here is sometimes used as an emphatic equivalent of p A POTEM [and then] q where there is no suggestion that such a sequence of events is unexpected. In the latter case, T (p, q) suffices as an interpretation of such use.

The same holds for the use which can be semantically characterized as admonitory, as in *You will do your homework first*, A DOPIERO POTEM [*and only then*] *will you go for a walk* where T (p, q) is enough for the formal interpretation, although it does not reflect the admonitory tone of the sentence.

A JEDNAK [and yet]

A JEDNAK [and yet] p	A JEDNAK [and yet] *Kowalski won.* $p \wedge (P(p) < P(\sim p))$

Kowalski won but for some reason it was expected that he would not. The use of this connective implies an appeal to some previous context in which case it links two sentences:

p A JEDNAK [and yet] q	*Kowalski was in poor shape,* A JEDNAK [and yet] *he won.*
	q CHOCIAŻ [although] p

(It must be noted that, in order to retain a uniform notation when it comes to the sequence of the connectives and the sentences to which they refer, q in example 2 marks the sentence labelled as p in example 1.)

A MIMO TO [and yet]

A MIMO TO [and yet] p	A JEDNAK [and yet] p
p A MIMO TO [and yet] q	p A JEDNAK [and yet] q

A MIMO WSZYSTKO [and after all]

A MIMO WSZYSTKO [and after all] p	A JEDNAK [and yet] p

Due to the occurrence of the word WSZYSTKO [all] (an adjective here used as a noun?), this is a connective expression rather than a multi-word connective (although this terminological distinction is more intuitive than it is strict). Two more remarks come to mind at this point: (1) WSZYSTKO [all] has an emphatic function here; and (2) in contrast to A MIMO TO [and yet], this expression never plays the role of an inter-sentence connective: + p A MIMO WSZYSTKO [and after all] q since WSZYSTKO [all], due to its meaning, substitutes for the overall context which would otherwise be represented by the sentence p in this unacceptable formulation.

A NAWET [and even]

p A NAWET [and even] q	$p \wedge q \wedge (P(q) <!1/2)$

A NIE [and not]

p A NIE [and not] q	*Kowalski does the long jump,* A NIE [and (he does) not (do)] *the hurdles.*
	$p_x \wedge \sim q_x$

In contrast to p A [and] q, it is used mainly when p and q share the same subject. Compare A [and].

A PRZECIEŻ [and yet]

p A PRZECIEŻ [and yet] q	q CHOCIAŻ [although] p

A WIĘC [and so]

p A WIĘC [and so] q	$p \wedge (qBO_ap)$
A WIĘC [and so] p	$\exists q(pBO_aq)$

Compare SKORO [since].

A ZATEM [and thus]

p A ZATEM [and thus] q	$p \wedge (qBO_ap)$
A ZATEM [and thus] p	$\exists q(pBO_aq)$

Compare SKORO [since].

ABY [to]

p ABY [to] q	p ŻEBY [to] q
ABY [to] p, q	ŻEBY [to] p, q
	$p(q)$

A stylistic (non-colloquial) variant of ŻEBY [to].

ACZ [although]

p ACZ [although] q	p CHOCIAŻ [although] q

A stylistic (archaic) variant of CHOCIAŻ [although].

ACZKOLWIEK [although]

p ACZKOLWIEK [although] q	p CHOCIAŻ [although] q

A stylistic (archaic) variant of CHOCIAŻ [although].

ALBO [or]

p ALBO [or] q

(a) non-exclusive	p LUB [or] q
	$p \vee q$
(b) exclusive	ALBO p ALBO q [either p or q]
	$p \vee q \wedge \sim (p \wedge q)$

The use of ALBO [or] indicates, or so it seems, that there is no clear distinction between the non-exclusive and the exclusive ALBO [or] (compare examples from SJP I 73-74). There is a clear sense of the exclusive use in the case of ALBO... ALBO... [either... or...], although here too there is a specific and explicitly highlighted non-exclusive use: ALBO p ALBO q ALBO I JEDNO, I DRUGIE [either p or q or both p and q].

ALBO... ALBO... [either... or...]

ALBO p ALBO q [either] [or]	*Every natural number is* ALBO [either] *even* ALBO [or] *odd.*
	$p \vee q \wedge \sim (p \wedge q)$

In practice, this connective is used most often in sentences regarding the future (all examples found in SJP I 74 are of this sort) and thus in sentences whose logical value can be indeterminate. In the latter case the interpretation would be slightly different:

ALBO p_{fut} ALBO q_{fut} [either] [or]	ALBO [either] *I will win,* ALBO [or] *I will lose.* $?p \vee ?q \wedge \sim (p \wedge q)$

ALBOWIEM [because]

p ALBOWIEM [because] q	p BO_a [because] q

A stylistic (non-colloquial) variant of BO_a [because].

ALE [but]

p ALE [but] q

This connective is one of the more difficult ones to describe by purely formal means. The difficulty stems from the fact that ALE [but], which expresses some opposition between p and q, often occurs in contexts where the opposition is strictly semantic and thus devoid of formal factors. At the same time, the opposition guarantees a semantic link between p and q without which the use of ALE [but] would be incorrect, leading to formulations in the style of the famous "Ohlendorf aphorisms:"[6]

+*My aunt is blond,* ALE [but] *my neighbour's horse is lame.*

A sentence like this is unacceptable precisely because the use of ALE [but] is not justified due to the lack of any recognizable semantic relationship between the sentence which precedes the connective and the one which follows it.

It has been suggested that in the case of p ALE [but] q TWO formally describable differences can be noticed (Harris 1968: 132). However, as we will see, this claim is insufficient and in at least one case inaccurate. It is insufficient since in the example above the two clauses share neither the subject not the predicate, which can be expressed in the following way:

[6]Old foreign language textbooks known for their comically artificial examples.

$$p_x \wedge q_y \wedge (x \neq y)$$

where $p \neq q$, according to the earlier assumption. The case of inaccuracy will be discussed later. Since ALE [but] often occurs together with the negation of the second clause, and NIE [not] is also treated as a connective in this paper, expressions of the type p ALE NIE [but not] q and NIE [not] p, ALE [but] q will be discussed under the headings dedicated to these compound connectives.

Now we turn to an analysis of several examples ordered according to the more or less increasing difficulty of formal description.

p ALE [but] q	*It is nice in Warsaw,* ALE [but] *it is pouring with rain in Zakopane.* $p_x \wedge q_y \wedge (x \neq y) \lfloor (p, \sim q)$
p ALE [but] q	*There is a metro system in London,* ALE [but] *in Warsaw there will only be one in a few years.* $p_x \wedge q_y \wedge (x \neq y) \lfloor (q, \sim p)$

Here we have a formally describable difference in the subject. We can also say that despite the formally marked lack of negation one clause linked with the connective ALE [but] linguistically entails the negation of the latter clause. Both conclusions are implied by the definitions of the words and expressions featuring in the above examples.

There is yet another issue to be considered here as it will reoccur throughout this paper. In both the above examples, in their formal interpretation, the first two elements of the conjunction refer to some particular cases captured by the clauses linked with the connective, while the third element is a general statement. It may thus be advisable to render this interpretation more precisely in the following way:

for the first example:

$$p_x \wedge q_y \wedge (x \neq y) \forall z (p_z, \sim q_z)$$

and for the second example:

$$p_x \wedge q_y \wedge (x \neq y) \forall z (q_z, \sim p_z)$$

In the first example the issue is rather simple: the extended comment says that the linguistic consequence of the fact that, for any given place, the weather is nice there, is that it is not pouring with rain there. In the second

example the matter is more complicated: the first part of the subscript concerns the determination of place, which is different from clause to clause, while its second part concerns the referent of the sentence (the subject, the logical subject according to the traditional grammatical interpretation, the TOPIC according to some more recent grammatical interpretations — successfully applicable in the case of some non-Indo-European languages). The linguistic consequence given in the last element of the conjunction states that if something is to occur in the future, it is not yet present.

p ALE [but] q	*Kowalski fought,* ALE [but] *he lost.*
	$p \wedge q \wedge \exists r L(p, r(\sim q))$

Here the formal interpretation calls for a new move: p does not directly entail the negation of q, nor does q directly entail the negation of p. However, such entailment can be directly obtained by the introduction of a sentence which does not feature in the discussed example. The following entailment is thus obtained: Kowalski fought, hence Kowalski tried ŻEBY [that] Kowalski does not lose, which after a transformation typical for the Polish language yields Kowalski fought hence Kowalski tried not to lose.

p ALE [but] q	*Kowalski is very hardworking,* ALE [but] *he is not talented.*
	$p \wedge q \wedge \exists r(r(p), \sim r(q))$

Here the problem is even more complicated. The proposed solution appeals to the following semantic interpretation which arguably reflects the intention of the discussed formulation: the speaker of any such sentence means to say that one of the clauses speaks positively of Kowalski, while the other speaks negatively of him. The complete interpretation is thus the following: *It is beneficial for Kowalski that he is very hardworking, but it is not beneficial (for him) that he is not talented.* The sentences it is beneficial and it is not beneficial are introduced into the interpretation as sentential functors according to the pattern mentioned earlier and they are selected in such a way that the latter functor is the negation of the first: $r(p) \wedge \sim r(q)$.

p ALE [but] q	*Sophie likes the Beatles,* ALE [but] *Mary has good taste.*
	$p_x \wedge q_y \wedge (x \neq y) \wedge \sim \exists z(p_z \wedge q_z)$

This use of ALE [but] is mentioned in the literature[7]. The above interpretation means that "no one with good taste likes the Beatles" (literally: "there is no person such that they like the Beatles and they have good taste") and it is in agreement with our understanding of this sentence. However, it may be even better to bring out the fact that the sentence in question is an abbreviation and should be understood as: *Sophie likes the Beatles,* ALE [but] *Mary does not like them, because Mary has good taste.* We thus see that has good taste is not opposed to likes the Beatles – the opposition is between likes the Beatles and the implicit does not like the Beatles, while has good taste is an explanation of the latter. Here the appropriate formal interpretation would be:

$$p_x \wedge (\sim p_y \mathrm{BO}_a q_y) \wedge (x \neq y).$$

This is in principle the end of the analysis of ALE [but] as commutative, that is to say expressed, among others, by a conjunction. However, this commutativity does not mean that p ALE [but] q and q ALE [but] p are no different from each other. We usually stress the clause which follows ALE [but] in some way and this opposing clause, as we have seen, somehow neutralizes the effect of the preceding clause. By saying that *Kowalski is very hardworking* ALE [but] *not talented* we emphasize his flaw, while by saying that *Kowalski is not talented* ALE [but] *very hardworking* we emphasize his merit. However, this issue pertains to pragmatics – the relationship between the speaker and his or her utterance – and its further analysis would require the introduction of additional concepts and symbolism.

Regarding the necessity of a semantic relationship between the clauses linked by ALE [but], it seems that whenever no one clause can be interpretively reduced to the negation of the other (at least partly, that is, with different subscripts retained, for example p_x and $\sim p_y$, which does not represent full negation but nevertheless shows a semantic link between the clauses through the shared use of p), one should and can appeal to the formulation that there exists a certain sentence r which can feature as a sentential functor once in its affirmative form and once in its negative form, once with p as its argument and once with q, which guarantees the necessary semantic link. We thus obtain a general formal interpretation of the type:

$$r(p) \wedge \sim r(q).$$

[7]This Polish language example is inspired by Irena Bellert's analysis of the English connective BUT (1969).

Let us now move on to the discussion of the non-commutative explicatory ALE [but].

p ALE [but] q	*The river swelled,* ALE [but] *the flood banks turned out to be high and solid enough.*
p ALE [but] q	*Mary turned around,* ALE [but] *her family home was no longer visible.*

Here we have a shorthand formulation which can be understood in the following way:

p ALE [but] q	*The river swelled with the threat of a flood,* ALE [but] *the flood banks turned out to be high and solid enough, so there was no flood.*
p ALE [but] q	*Mary turned around to see her family home once more,* ALE [but] *it was no longer visible, so she did not see it.*

Interpreted as such, the two examples can be symbolically expressed in the following way:

p ALE [but] q	$p \wedge q \wedge \exists s \exists r((p = r(s)) \wedge (\sim r \mathrm{BO}_a q))$.

Put shortly in words: (i) "there was a threat of a flood but there was no flood because…;" (ii) "wanted to see her family home but did not see it because…" The semantic link is retained due to the presence of r and $\sim r$. These examples, much like the Beatles one, contain in their original form a certain shorthand formulation which needs to be explicated before a more precise interpretation is possible.

The last two examples, and perhaps the Beatles example as well (there the problem is a bit more complicated), do not meet the commutativity condition, which is readily visible when p and q are in their original form. Perhaps the presence of a shorthand formulation which needs to be explicated before an interpretation can be proposed goes hand in hand with the commutativity of ALE [but].

There remains the issue of opposition. A doubt can be raised that, given that p and q are always treated as true, the requirement that they be mutually opposed may lead to contradiction. However, there is no contradiction since:

(i) wherever q entails $\sim p$, p and q have different subscripts; given the difference in argument, what is negated is the functor and not the entire sentence; (ii) elsewhere, the negation does not concern directly p and q but the sentential functor r with regard to which p and q are sentential arguments; (iii) yet elsewhere, the sentence r is introduced which is once in the affirmative and once in the negative; here contradiction is avoided due to the fact that in the first instance r is a sentential argument, while in the latter instance it is an independent sentence.

ALE NIE [but not]

p ALE NIE [but not] q	*There is a metro system in London,* ALE NIE [but (there is) none] *in Warsaw.* $p_x \wedge \sim p_y \wedge (x \neq y)$.

Here too the double difference condition is met for p and q: $x \neq y$ and p is negated in one instance but not in the other. This example also meets the commutativity condition:

NIE [not] q ALE [but] p	*There is* NIE [no(t)] *metro system in Warsaw,* ALE [but] *there is one in London.* $\sim p_y \wedge p_x \wedge (x \neq y)$.

This in turn yields the preceding formalization based on the commutativity of conjunction as applied to the first two elements.

p ALE NIE [but not] q	*It is raining,* ALE NIE [but (it is) not] *pouring.* $p \wedge \sim q \wedge L(q,p) \wedge \sim L(p,q)$.

Here we have the usual difference between p and q plus the presence of negation in one of the sentences as the second difference. Moreover, one of the sentences entails the other, while the opposite entailment does not obtain. The commutativity condition is met:

NIE [not] q ALE [but] p	*It is* NIE [not] *pouring*, ALE [but] *it is raining.*

The notation is the same as in example 3, given the remark following example 2.

Let us now consider, as an exception, an atypical facetious usage of the formulation NIE [not] p, ALE [but] q[8]:

NIE [not] p ALE [but] q	*It is* NIE [not] *raining,* ALE [but] *it is pouring.* $q \wedge L(q,p) \wedge \sim L(p,q)$.

The notation is different here: there is no $\sim p$, which is understandable since, as q obtains and q entails p, $\sim p$ cannot obtain. This is why the example does not meet the commutativity condition:

+*It is pouring,* ALE NIE [but (it is) not] *raining.*

ALE... TEŻ [but... also]

p ALE [but] q TEŻ [also]	*Kowalski applied,* ALE [but] *Kwiatkowski* TEŻ [also] *applied.*

This example is a quite precise linguistic equivalent of the one given by Harris as an exception to his thesis that there should be two differences between the clauses linked with ALE [but] (see Footnote 7). Here we only have the difference in the subject. Harris himself notes the specific role of TEŻ [also] (that is to say, its English equivalent) but he does not offer any detailed explanation. Semantic interpretation may be helpful here, with the following explication of the example in question:

Kowalski applied, which might seem enough, ALE [but] *Kwiatkowski* TEŻ [also] *applied, which shows that Kowalski's application was not enough.*

A closer look at this interpretation indicates that, contrary to what appears, this situation is different from the case of the simple ALE [but]: there the formal interpretation did not require the notion of probability. ALE... TEŻ [but... also], as we now see, only appears similar to ALE [but] and it calls for a probabilistic interpretation. The sentence in question can be relatively precisely paraphrased as:

[8] An example proposed by Zdzisław Pawlak (private correspondence).

Kwiatkowski applied, CHOCIAŻ [although] *Kowalski applied.*

The entire interpretation can now be reduced to:

p ALE [but] q TEŻ [also]	q CHOCIAŻ [although] p

ANI... ANI... [neither... nor...]

ANI [neither] p ANI [nor] q	$\sim p \wedge \sim q$.

One of the many cases where a connective featuring in a natural language can arguably be precisely described using a sentential functor of the propositional calculus.

ATOLI [but]

p ATOLI [but] q	p ALE [but] q

A stylistic (archaic) variant of the explicatory ALE [but]. Unlike ALE [but], it is usually placed inside the sentence q and not between p and q (compare SJP I 240-1).

AŻEBY [to]

p AŻEBY [to] q	p ŻEBY [to] q

$p(q)$

A stylistic (non-colloquial) variant of ŻEBY [to].

BO [because]

p BO [because] q

(a) explicatory

p BO_a [because] q	*Kowalski fell,* BO [because] *it was slippery.* *Kowalski is worried,* BO [because] *his daughter has not been admitted into university.* $p \wedge q \wedge \sim T(p,q) \wedge (P(p \wedge q) > P(p \wedge \sim q))$.

The connective BO [because] is often related to the notion of cause. However, since this notion does not have a satisfactory interpretation, especially one which might be conducive to formal description, it seems more appropriate to assume that the connective has an explicatory function. If q does not entail p, the explication is probabilistic: the probability of the event referred to in p, given the previous or simultaneous occurrence of the event described in q, is greater than the probability of the first without the occurrence of the latter (without its occurrence in a certain time interval: we will not say that + *Kowalski fell yesterday,* BO [because] *it was slippery the previous winter*; the relevant time interval is determined based on our knowledge of the world).

p BO_a [because] q	*18 is divisible by 3,* BO [because] *it is divisible by 6.*

Here the interpretation is not probabilistic. Its formal notation can be twofold:

$$p_x \wedge q_x \wedge \forall z(q_z \Rightarrow p_z),$$

$$p \wedge q \wedge (q \overset{o}{\Rightarrow} p).$$

(b) cautionary

The cautionary meaning of BO [because] seems to distinguish this connective from among those related to the notion of cause. It has two variants:

(b1)

$p!$ BO_{b1} $q_{fut,2}$	*Watch out,* BO [because] *you will fall!* $\sim p_{fut,2} \overset{o}{\Rightarrow} (P(q_{fut,2} > n))$.

If you do not watch out, it is probable that you will fall.

In this context, instead of BO [because] one often uses BO INACZEJ [or else].

(b2)

$p!$ BO_{b2} q	*Watch out,* BO [because] *it is slippery!* $q \wedge \exists r((q \wedge \sim q_{fut,2}) \overset{o}{\Rightarrow} (P(r_{fut,2}) > n))$.

Unlike (b1), the event which calls for caution is not mentioned explicitly here and can only be guessed by properly interpreting the sentence q based on one's knowledge of the world. This is why in the formal notation the clause referring to this event must be supplemented on the right; the variable which stands for this clause is thus bound by the quantifier. The following interpretation in the natural language is possible: *It is slippery, and when it is slippery and you do not watch out, it is probable that you will fall.* Here BO [because] cannot be substituted by BO INACZEJ [or else].

Two more remarks are in order.

First, in (b1) and (b2) the second person can be substituted with the third; the relevant subscript will then change and it must be changed in all places.

Secondly, the number n which serves as a probability indicator may vary in practice; if there is some serious danger, a low value of n is enough to justify the cautionary tone; in case of something benign, only a relatively high value of n can provide such justification.

BOĆ [because]

p BOĆ [because] q $\qquad$ p BO$_a$ [because] q

A stylistic (archaic) variant of BOa [because].

BOWIEM [because]

p BOWIEM [because] q $\qquad$ p BO$_a$ [because] q

A variant of ALBOWIEM [because], the difference being their respective position in the sentence (it is positioned inside the sentence q).

BY [to]

p BY [to] q $\qquad$ p ŻEBY [to] q

$p(q)$

A stylistic (written) variant of ŻEBY [to], perhaps used more often in the intentional and not the dubitative sense of ŻEBY [to].

BYLE TYLKO [if only]

BYLE TYLKO [if only] p $\qquad$ ŻEBY CHOCIAŻ$_b$ [if only] p

BYLEBY [if only]

BYLEBY [if only] p	ŻEBY CHOCIAŻ$_b$ [if only] p

CHOCIAŻ [although]

p CHOCIAŻ [although] q	*Kowalski won,* CHOCIAŻ [although] *he was in poor shape.* $p \wedge q \wedge (P(p \wedge q) < P(\sim p \wedge q))$.

Interpretation: "Kowalski won; Kowalski was in poor shape; the probability of winning when one is in poor shape is lower than the probability of not winning when one is in poor shape" (strictly speaking, it is the probability of the truth of the relevant sentences). Unlike in Kotarbiń ski's interpretation cited in the introduction, here we have the reduction of concepts related to the expression "raises reasonable doubt" to the comparative probability of the truth of certain correctly constructed sentence formulae.

An objection can be raised here that p and q refer to some particular event (the given fight by Kowalski), while the third element of the conjunction given in the formal interpretation refers to a general truth and thus the notation should look like this:

$$p_x \wedge q_x \wedge \forall z(P(p_z \wedge q_z) < P(\sim p_z \wedge q_z)).$$

On the other hand, there are more complicated examples:

p CHOCIAŻ [although] q	*Kowalski lost,* CHOCIAŻ [although] *his opponent was in poor shape.*

Since here we have two different subjects in p and q, the formal notation must be more complicated:

$$p_x \wedge q_x \wedge \forall v,w(P(p_v \wedge q_w) < P(\sim p_v \wedge q_w)).$$

It seems to be an open question whether the formulation of the last element of the conjunction as a "general truth" is necessary or whether it suffices to compare the probabilities merely with regard to the discussed instances as is the case in the formal interpretation given in the first place.

CHOĆ [although]

p CHOĆ [although] q p CHOCIAŻ [although] q

A stylistic (colloquial) variant of CHOCIAŻ [although].

CHYBA [likely]

CHYBA [likely] p_{fut}	*Mary will* CHYBA [likely] *pass the exam.* $?p \wedge (P(p) > P(\sim p))$.
CHYBA [likely] p_{past}	*It was* CHYBA [likely] *John who came in.* $P(p) > P(\sim p)$.

Example 1 is about a possible future event and thus the logical value of the sentence p is not yet determined in the given moment. Example 2 is about a past event which is not well known to the speaker, which is why there is no $?p$ in the symbolic notation. The difference between these two interpretations is practically insignificant since its most important element is the comparison between the probabilities of the truth of p and $\sim p$. The interpretation for the present tense is analogous to the future tense:

CHYBA [likely] p_{pres}	*There is* CHYBA [likely] *a storm coming.* $?p \wedge (P(p) > P(\sim p))$.

CHYBA ŻE [unless]

p_{fut} CHYBA ŻE [unless] q_{fut}	*I will go,* CHYBA ŻE [unless] *the flood destroys the bridge.* $?p \wedge ?q \wedge (\sim q \overset{o}{\Rightarrow} p)$.

The speaker uttering the sentence *I will go,* CHYBA ŻE [unless] *the flood destroys the bridge* claims that only the destruction of the bridge can cause him or her not to go. This is a simplification which consists in a silent exclusion of the real probability of the occurrence of other events which might render the journey impossible. However, this is in keeping with the normal way of speaking; it would be burdensome to say: *I will go,* CHYBA

ŻE [unless] *the flood destroys the bridge, or I suddenly die, or I become bed-ridden, or I am physically or legally incapacitated in any way*, etc.

p_{past} CHYBA ŻE [unless] q_{past}	*Kowalski has gone for a holiday,* CHYBA ŻE [unless] *he was denied his leave.* $\sim q \overset{o}{\Rightarrow} p$.

Despite differences in the formal notation, there are certain analogies with CHYBA [likely] here: when we speak of a past event which is unknown to us, we cannot supplement for p and q sentences with an indeterminate logical value since they are supposed to be already true or false, only we do not know their value. Moreover, it should be noted that p and q can also be in the present. Other tense combinations are possible as well, which is appropriately reflected in the formal notation:

p_{fut} CHYBA ŻE [unless] q_{past}	*I will go,* CHYBA ŻE [unless] *the flood has destroyed the bridge.* $p \wedge (\sim q \overset{o}{\Rightarrow} p)$.

Other tense combinations and their notation can be determined based on the above examples.

CHYBA ŻEBY [unless]

p CHYBA ŻEBY [unless] q	p_{fut} CHYBA ŻEBY [unless] q_{past}

A stylistic variant of p_{fut} CHYBA ŻE [unless] q_{fut}, with ŻEBY [that] in its dubitative sense. Given this, the expression seems to indicate that, according to the speaker, the probability of the truth of the sentence q_{fut} is lower than when CHYBA ŻE [unless] is used.

CO [that]

p CO [that] q	p ŻE [that] q $p(q)$.

A dialect variant of ŻE [that].

COBY [that]

p COBY [that] q	p ŻEBY [that] q
	$p(q)$.

A dialect variant of ŻE [that].

DLATEGO [therefore]

DLATEGO [therefore] p	$\exists q(p \text{ BO}_a\ q)$.
	$p(q)$.

See also

p I DLATEGO [and therefore] q.

DLATEGO TEŻ [therefore]

DLATEGO TEŻ [therefore] p	DLATEGO [therefore] p

A stylistic (emphatic) variant of DLATEGO [therefore].

DLATEGO ŻE [for (the reason) that]

p DLATEGO ŻE [for (the reason) that] q	p BO_a [because] q

A stylistic (non-colloquial) variant of BOa [because].

DLATEGO ŻEBY [in order to]

p DLATEGO ŻE [in order to] q	p ŻEBY q

DLATEGO ŻEBY [in order to] fulfils the function of the intentional ŻEBY [to]. It seems that DLATEGO [therefore] is not the proper connective in this expression, although it retains its etymological sense of "for this [reason]": "He did it DLATEGO ŻEBY [in order to]..." = "He did it for the reason ŻEBY [to]..."

DOPÓKI [as long as]

p DOPÓKI [as long as] q	$p \wedge q \wedge \sim T(\sim p, \sim q) \wedge (\sim q \overset{o}{\Rightarrow} \sim p)$.

Compare DOPÓTY... DOPÓKI... [as long as]

p DOPÓKI NIE [as long as not] q

Compare DOPÓTY... DOPÓKI... [as long as] in fine

DOPÓTY... DOPÓKI... [as long as]

DOPÓTY p DOPÓKI q [as long as]	*Kowalski works* DOPÓTY, DOPÓKI [as long as] *he has energy.* $p \wedge q \wedge \sim T(\sim p, \sim q) \wedge (\sim q \overset{o}{\Rightarrow} \sim p)$.

Both p and q obtain, while $\sim p$ obtains simultaneously with $\sim q$; the event determined by $\sim p$ is antecedent with respect to that determined by $\sim q$. At the same time, the latter event entails the first.
A variant of this connective often features NIE [not] in the second element:

DOPÓTY p DOPÓKI NIE q [as long as not]	DOPÓTY *the jar carries water,* DOPÓKI [as long as] *the lug is* NIE [not] *broken.* $p \wedge \sim q \wedge \sim T(\sim p, q) \wedge (q \overset{o}{\Rightarrow} \sim p)$.

The interpretation here is analogous to example 1, only the sentence q is substituted with $\sim q$.

DZIĘKI TEMU, ŻE [due to the (fact) that]

p DZIĘKI TEMU, ŻE q [due to the (fact) that]	p BO_a [because] q.

A connective expression.

GDYBY... TO BY... [if... then...]

GDYBY p TO BY q
[if] [then]

This construction is difficult to analyze. There is rich literature dedicated to its grammatical (modus irrealis) as well as logical aspect (counterfactual conditionals – see Marciszewski 1970: 115–116). Its English equivalents have also been analyzed in detail recently[9]. Both p and q are usually interpreted as false here, as is evidenced by the following common saying:

[9]By an American linguist E. Charney, among others (her work is known to the author of this paper from a preprint). In English the use of a connective in this construction is substituted by the use of appropriate tenses and modes.

GDYBY *p* TO BY *q* [if] [then]	GDYBY [if] *little goat did not leap,* TO BY [then] *it would not have broken its hip.* GDYBY [if] *Aunt Felicity had wheels,* TO BY [then] *she would be a tram.* $\sim p \wedge \sim q$.

The usual interpretation is that (1) little goat did leap and it did break its hip; and (2) Aunt Felicity does not have wheels and is not a tram.

However, the sentence q can be selected such that the above interpretation would no longer hold, for example:

GDYBY *p* TO BY *q* [if] [then]	GDYBY [if] *Aunt Felicity were named Anna,* TO BY [then] *she would be a woman.*

Here the assumption that $\sim q$ would mean that Aunt Felicity is not a woman which goes against the normal use of that name – in Polish this norm is at least partly a linguistic one (since the meta-language sentence "Felicity is a woman's name" regards the linguistic element Felicity).

Another complication stems from the fact that — in contrast to English, for example, where the use of tenses and modes allows for a better orientation in the situation -– the Polish conditional mode does not clearly indicate whether the events in question have already happened or could happen in the future.

What follows is an attempt to order (but not to simplify) the many different interpretations, depending on several factors.

(a) for sentences about events which could or were supposed to happen in the past, or else could or are supposed to happen in the present:

GDYBY p TO BY q [if] [then]	GDYBY [if] *little goat did not leap,* TO BY [then] *it would not have broken its hip.* GDYBY [if] *Kowalski were rich,* TO BY [then] *he would have a Mercedes.* GDYBY [if] *Aunt Felicity had moustache,* TO BY [then] *she would be a man.* $\sim p \wedge \sim q$. GDYBY [if] *Aunt Felicity had moustache,* TO BY [then] *she would be a woman.* $\sim p$.

(b) for sentences about events which could happen in the future:

GDYBY p_{fut} TO BY q_{fut} [if] [then]	GDYBY [if] *Kowalski wins a million,* TO BY [then] *he will buy himself a Mercedes.* $?p \wedge ?q$. GDYBY [if] *Aunt Felicity wins a million,* TO BY [then] *she will be a man.* $?p \wedge \sim q$. GDYBY [if] *Aunt Felicity had moustache,* TO BY [then] *she would be a woman.* GDYBY [if] *Aunt Felicity wins a million,* TO BY [then] *she will be a woman.* $?p$.

(c) for sentences referring to deductive systems:

GDYBY p TO BY q [if] [then]	GDYBY [if] *17 were divisible by 4,* TO BY [then] *it would be divisible by 2.* GDYBY [if] *17 were divisible by 4,* TO BY [then] *it would* NIE [not] *be divisible by 2.* $\sim p$.

In group (a) there are two options: in the interpretation of the expression GDYBY [if] p TO BY [then] q we always assume that $\sim p$ and for q, that $\sim q$ if $P(q) < 1$ (including if $P(q) = 0$). In group (b) there are three options: we always assume that $?p$ and for q, that $?q$ if $P(q) < 1$. In group (c) we always assume that $\sim p$ and the second clause remains uninterpreted on the assumption that in a deductive system all sentences are mutually connected by the relation of inference. We have here a system where $\sim p$ is true and, were we to change the system so that p is true, it would imply other changes in the overall inferential structure which cannot be foreseen based on the mere assumption of the truth of p. Hence there is no sufficient basis to determine whether q is true or $\sim q$ is true[10].

The fact that an expression containing clauses about events which could or were supposed to happen in the past have made it into the Polish language as a proverb suggests that in practice the expression GDYBY [if] p TO BY [then] q is most often used in precisely this way, which allows for an interpretation of both p and q as false.

GDYŻ [since]

p GDYŻ [since] q	p BO_a [because] q I [and]
p I [and] q	

I [and] as an inter-sentence connective in the Polish language differs significantly from the I [and] used in the propositional calculus. Several cases need to be distinguished.

(a) conjunctive

[10]This interpretation may require further analysis. From the linguistic point of view, the matter is less significant since the untrue counterfactual conditionals of the type discussed in Marciszewski 1970: 115–116 are relatively rare in practical use.

p I [and] *q*	*Kowalski teaches at the sports school,* I [and] *he trains the shotput team.* $p \wedge q$.

In this case, I [and] is commutative, much like in the propositional calculus. There is nothing that might prevent one from saying:

Kowalski trains the shotput team, I [and] *he teaches at the sports school.*

This is the most frequent, although perhaps not the only, case where p and q share the same subject. Hence the following symbolic notation is also possible:

$$p_x \wedge q_x.$$

In the case that the subject is different, in Polish (but not in English, for example), A [and] is preferred. A [and] is also commutative: *Kowalski teaches at the sports school,* A [and] *Kwiatkowski trains the shotput team = Kwiatkowski trains the shotput team,* A [and] *Kowalski teaches at the sports school*[11].

(b) sequential

p I [and] *q*	*The shot was fired,* I [and] *the wild boar fell dead to the ground.* *The key gnashed in the lock,* I [and] *the door opened* (SJP 3 141). $p \wedge q \wedge P(p, q)$.

[11]Here we ignore those cases of the commutative I [and] where the sequence p – q is preferred over the sequence q – p due to certain phonetic reasons, for example due to intonation. For reasons of intonation we will say *The insects were buzzing and fluttering their little wings* and not *The insects were fluttering their little wings and buzzing.* The concluding verb in the latter sentence makes the impression that the sentence is unfinished. However, if we modify the initial example into *The insects were buzzing joyfully and fluttering their little wings*, the reversal seems to yield an acceptable sentence: *The insects were fluttering their little wings and buzzing joyfully.* The sequence of p and q can also be decided based on stylistic concerns (emphasis) which are ignored here as well (compare the remarks on the commutativity of ALE [but]).

The retention of the same subject is not significant. The sequential I [and] is not commutative:

+*The wild boar fell dead to the ground,* I [and] *the shot was fired.*

+*The door opened,* I [and] *the key gnashed in the lock.*

(c) explicatory

p I [and] *q*	*Kowalski fell off a horse,* I [and] *he broke his arm.* *The ladder slipped down,* I [and] *Kowalski could not get off the roof.* $p \wedge q \wedge (q \ \mathrm{BO}_a \ p)$.

The retention of the same subject is not significant. The explicatory I [and] is not commutative:

+*Kowalski broke his arm,* I [and] *he fell off a horse.*

+*Kowalski could not get off the roof,* I [and] *the ladder slipped down.*

In the first example above, the sentence *Kowalski broke his arm,* I [and] *he fell off a horse* might perhaps be acceptable in some broader context where the point was not to explain the circumstances in which the arm was broken but to enumerate the adversities faced by Kowalski: *Kowalski has had bad luck lately, he broke his arm,* I [and] *he fell off a horse.* However, even here we would more likely say: *Kowalski has had bad luck lately, he broke his arm,* A PONADTO [and moreover] *he fell off a horse.*

(d) accessory

p I [and] *q*	*Kowalski sings* I [and] *accompanies himself on the guitar.* $p_x \wedge q_x \wedge L(q_x, p_x)$.

The accessory I [and] is not commutative:

+*Kowalski accompanies himself on the guitar* I [and] *he sings.*

The same subject is usually present in both clauses, even though this is not a strict rule. If the subject is different, the accessory A [and] is usually used: *Kowalski sings,* A [and] *Kwiatkowski accompanies him on the guitar*. The accessory A [and] is not commutative either: + *Kwiatkowski accompanies him on the guitar,* A [and] *Kowalski sings.*

As can be seen from the above analysis, the non-commutativity of I [and] is indicated indirectly in that in the symbolic notation in (b), (c) and (d) the conjunction "$p \wedge q$" is followed by some additional condition.

The choice of the right interpretation of I [and] in a given case is conditioned semantically since it depends on the semantic relationship between p and q. This renders the automatic interpretation of this connective difficult.

It also needs to be noted that in certain compound connectives containing I [and], it is absorbed in the symbolic notation by a conjunction which is otherwise present there. For example, "p A ZATEM I [and thus also] q" is interpreted as: "p A ZATEM [and thus] q" = "q BO_a [because] p". The latter (compare the explicatory BO [because]) is in turn interpreted such that in the symbolic notation the conjunction "$q \wedge p$" = "$p \wedge q$" absorbs the conjunction suggested by I [and] in "p A ZATEM I [and thus also] q". Multi-word connectives containing a redundant I [and] are not discussed under independent headings in this paper.

I... I... [both... and...]

I [both] p I [and] q

Surprisingly, this is not a simple stylistic variant of p I [and] q since it excludes the explicatory interpretation: if instead of *Kowalski fell off a horse,* I [and] *he broke his arm* we say *Kowalski* I [both] *fell off a horse, I [and] broke his arm*, we arguably stress the lack of connection between the two events described here. The accessory interpretation is perhaps possible, although such usage appears to be relatively rare. The conjunctive and sequential interpretations are typical for this connective, and the repetition of the connective I [and] gives the sentence a more enumerative tone. Incidentally, multiple repetitions are possible:

I [and] *people are working in the field,* I [and] *cattle are grazing,* I [and] *birds are singing.*

I [and] *he looks around,* I [and] *he cannot believe his eyes.*

I [and] *he is fainter and fainter from horror* (Wyspiański).

In example 1 we have the conjunctive interpretation, while in example 2, the sequential one.

IŻ [that]

p IŻ [that] q $\quad$ p ŻE [that] q

$p(q)$.

A stylistic (non-colloquial) variant of ŻE [that], also used for euphonic reasons (instead of *The minister stated,* ŻE [that] *the government of his country...* we will say *The minister stated,* IŻ [that] *the government of his country...*). [The word government starts with the "Ż" sound in Polish – trans.]

IŻBY [that]

p IŻBY [that] q $\quad$ p ŻEBY [to] q

$p(q)$

A stylistic (archaic) variant of ŻEBY [to].

JAKBY... TO BY... [if... then...]

JAKBY [if] p TO BY [then] q $\quad$ GDYBY [if] p TO BY [then] q

A stylistic (more colloquial) variant of GDYBY [if] p TO BY [then] q.

JAKKOLWIEK [although]

p JAKKOLWIEK [although] q $\quad$ p CHOCIAŻ [although] q

A stylistic (non-colloquial) variant of CHOCIAŻ [although].

JAKKOLWIEK... (TO)... [however... (then)...]

JAKKOLWIEK p [however] (TO) [(then)] q q CHOCIAŻ [although] p

The bracketing of TO [then] indicates that it can be omitted and substituted with a comma which then separates the clause p from the clause q. A stylistic (non-colloquial) variant of CHOCIAŻ [although].

JAKO ŻE [as]

p JAKO ŻE [as] q p BO_a [because] q

A stylistic (archaic or official) variant of BO_a [because].

JAKOBY [that]

p JAKOBY [that] q p ŻEBY [that] q

A stylistic, more colloquial, variant of the dubitative ŻEBY [that]. It stresses the doubtful character of the sentence more strongly.

JEDNAK [yet]

JEDNAK [yet] p A JEDNAK [and yet] p

p JEDNAK [yet] q p A JEDNAK [and yet] q

JEDNAKŻE [yet]

JEDNAKŻE [yet] p A JEDNAK [and yet] p

p JEDNAKŻE [yet] q p A JEDNAK [and yet] q

JEŚLI [if]

For all forms containing JEŚLI [if], see JEŻELI [if].

JEŻELI [if]

p JEŻELI [if] q JEŻELI [if] q TO [then] p

JEŻELI NAWET [even if]

p JEŻELI NAWET [even if] q $\quad$ p CHOCIAŻ [although] $q \wedge (P(q) <!\frac{1}{2})$.

The interpretation is quite difficult if we restrict it to the apparatus assumed in this paper. This connective has a strong pragmatic flavour. It is an expression of doubt on the part of the speaker as to whether the clause q is true. However, our apparatus does not include any technique with which to mark any pragmatic attitude.

JEŻELI NAWET p TO q [even if] [then] $\quad$ q JEŻELI NAWET [even if] p

JEŻELI... TO... [if... then...]

JEŻELI [if] p TO [then] q

This expression is the topic of rich literature, especially within logic. Its interpretation in the natural language is different from that of logical implication in the propositional calculus. The proposed interpretation is in fact a rendition of "JEŻELI [if] p TO [then] q" using the so-called "strict implication," which in modal logic represents an attempt to approximate the use of the expression in logic to its use in the natural language (Marciszewski 1970: 81–82, "implication").

JEŻELI [if] p TO [then] q $\quad$ $p \overset{o}{\Rightarrow} q$.

JEŻELIBY NAWET [even if]

p JEŻELIBY NAWET [even if] q $\quad$ $p \wedge ?q \wedge \sim(q \overset{o}{\Rightarrow} \sim p)$.

When compared with JEŻELI NAWET [even if], the logical value of q here is not yet determined. This is why the interpretation cannot appeal to CHOCIAŻ [although] since in the case of the latter connective it is assumed that both p and q are true.

JEŻELIBY NAWET p TO q [even if] [then] $\quad$ q JEŻELIBY NAWET [even if] p

JEŻELIBY... TO BY... [if... then...]

JEŻELIBY p TO BY q
[if] [then]

GDYBY [if] p TO BY [then] q (b)

A variant of GDYBY... TO BY... [if... then...] which seems to be used more often with regard to events that might happen in the future. However, there does not seem to be any strict limitation on the use of this connective.

LECZ [but]

p LECZ [but] q

p ALE [but] q

A stylistic (non-colloquial) variant of ALE [but].

LUB [or]

p LUB [or] q

$p \vee q$

In the natural language the non-exclusive use of LUB [or], that is, one which allows for both p and q to be true, seems to be much rarer than is the case in the propositional calculus, where it follows from the very definition of this functor. In Polish LUB [or] is arguably less exclusive than ALBO [or]. However, the distinction between the two is much weaker than that between VEL and AUT in Latin.

MIMO ŻE [despite (the fact) that]

p MIMO ŻE [despite (the fact) that] q

p CHOCIAŻ [although] q

MOŻE... (A) MOŻE... [maybe... (and) maybe...]

MOŻE [maybe] p (A) MOŻE [(and) maybe] q

MOŻE [maybe] *he got sick*, (A) MOŻE [(and) maybe] *he did not get a leave.*
MOŻE [maybe] *I will go to Zakopane*, (A) MOŻE [(and) maybe] *I will go to the Mazury Lake District.*
$P(p) = P(q)$.

NAWET [quite]

NAWET [quite] p	Kowalski is NAWET [quite] talented. $p \wedge (P(p) <!\frac{1}{2}$.

This construction may be an understatement as it suggests some kind of follow-up. The following full form is suggested:

NAWET [quite] p ALE [but] q $\quad p$ ALE [but] $q \wedge (P(p) <'!\frac{1}{2})$.

It seems that not all cases of ALE [but] come into play here, only the oppositional and the explicatory one, and perhaps only those interpretations of the structure "p ALE [but] q" that require the introduction (under the small quantifier) of the sentence r or sentences s and r (compare ALE [but] in fine).

NI... NI... [neither... nor...]

NI [neither] p NI [nor] q	ANI [neither] p ANI [nor] q

A stylistic (non-colloquial) variant of ANI... ANI... [neither... nor...]

NIEMNIEJ JEDNAK [yet]

p NIEMNIEJ JEDNAK [yet] q $\quad q$ CHOCIAŻ [although] p

O ILE [insofar as]

p O ILE [insofar as] q	JEŻELI [if] q TO [then] p

O ILE... TO... [insofar as... then...]

O ILE [insofar as] p TO [then] q	JEŻELI [if] p TO [then] q

PONIEWAŻ [since]

p PONIEWAŻ [since] q	p BO$_a$ [because] q

PONIEWAŻ [since]... TO [then]...

PONIEWAŻ [since] p TO [then] q	q BO$_a$ [because] p

PONIEWAŻ... WIĘC... [since... thus...]

PONIEWAŻ p WIĘC q [since] [thus]	q BO_a [because] p

PÓKI [as long as]

Compare DOPÓKI [as long as].

Compare DOPÓTY...DOPÓKI [as long as].

PRZETO [because]

p PRZETO [because] q	q BO_a [because] p
p! PRZETO [then]	Watch out PRZETO [then]!
	$\exists q(p!\ \mathrm{BO}_{b2}\ q)$.

A stylistic (archaic) variant of the explicatory BO [because] as well as the second meaning of the cautionary BO [because] with one modification: the clause which specifies the danger is not formulated explicitly in the use of PRZETO [because] discussed here. However, it is usually present in the context preceding "p! PRZETO [then]" and PRZETO [then] in this use clearly refers to what was said earlier.

SKORO [since]

p SKORO [since] q	$q \wedge (q \overset{o}{\Rightarrow} p)$.
SKORO [since] p TO [then] q	$p \wedge (p \overset{o}{\Rightarrow} q)$.

This interpretation differs slightly from that of JEŻELI... TO... [if... then...]: unlike the latter connective, which merely points to the entailment of one clause by the other, SKORO [since] appears to be used predominantly where the event described in the antecedent of the (strict) implication has already happened. The use of SKORO [since] thus resembles the inferential procedure based on *modus ponendo ponens*.

TO... TO... [at once... at once...]

TO [at once] p TO [at once] q	*She* TO [at once] *laughed,* (she) TO [at once] *cried.*
	$p \wedge q \wedge (T(p,q) \vee T(q,p))$.

This interpretation is not satisfactory since it merely indicates that the events specified in p and q did not occur simultaneously, yet it does not take into account the fact that the discussed formulation also suggests multiple, though interchangeable, repetition of these clauses. However, the full interpretation of this connective would require an extension of the apparatus assumed in this paper.

WIĘC [thus]

p WIĘC [thus] q $\quad p \wedge (p \overset{o}{\Rightarrow} q)$

Compare the remark after SKORO [since].

WPRAWDZIE... ALE... [admittedly... but...]

WPRAWDZIE [admittedly] p ALE [but] q $\quad q$ CHOCIAŻ [although] p

ZANIM [before]

p ZANIM [before] q $\quad$ *John returned home,* ZANIM [before] *the storm broke out.*
$p \wedge q \wedge T(p, q)$.

The interpretation is not fully satisfactory since it treats the formulation in question as if it were the usual sequential I [and]. This formulation could be viewed as a stylistic variant of the sequential I [and] such that the emphasis is not on the conjunction but on the sequence of the events described in p and q.

ŻEBY CHOCIAŻ [if only]

ŻEBY CHOCIAŻ [if only] p

Semantic analysis indicates that the occurrence of the event specified in the clause p represents for the speaker some minimum condition for his or her contentment, and the minimalism of that condition needs to be stressed. Moreover, it is necessary to distinguish whether the event in question could happen but it is already known that it did not or is not happening, or whether it could happen in the future.

(a)

ŻEBY CHOCIAŻ $p_{past,pres}$ [if only]	ŻEBY CHOCIAŻ [if only] *he had said goodbye.* $\sim p \wedge \exists q \forall r(q \overset{o}{\Rightarrow} p) \overset{o}{\Rightarrow} r(q))$.

(b)

ŻEBY CHOCIAŻ p_{fut} [if only]	ŻEBY CHOCIAŻ [if only] the weather is nice tomorrow. $?p \wedge \exists q \forall r(q \overset{o}{\Rightarrow} p) \overset{o}{\Rightarrow} r(q))$.

The only difference between the two examples is the logical value of the clause p. The strict implication between p and q indicates — given that q is under the big quantifier -– that p describes precisely the minimum condition mentioned above.

ŻEBY TYLKO [if only]

ŻEBY TYLKO [if only] p	ŻEBY CHOCIAŻ$_b$ [if only] p

Postscriptum ad A [and]:

p! A $q_{fut,2}$	Work hard, A [and] you will surely get results. $p_{fut,2} \overset{o}{\Rightarrow} q_{fut,2}$.

* *
*

The interpretations given above can certainly raise some doubts, as they do for the author of this paper. Most of them stem from the fact that the understanding of the relevant connectives by users of the Polish language is certainly not strict, nor is it unambiguous. Semantic and even more elusive and contextual stylistic differences come into play here, as do euphonic factors. This is hard to remedy if the goal of the analysis is to provide a semantic interpretation conducive to formal description. Given the extremely simple and modest apparatus used here the differences mentioned above must remain. The same holds, to an extent, for the reduction of some

connectives to others characterized by the same basic meaning. It may be protested that the reduction of "WPRAWDZIE [admittedly] p ALE [but] q" to "q CHOCIAŻ [although] p" is an oversimplification, perhaps a far-fetched one. Perhaps, but then again, given the available formal apparatus, it is arguably the only solution. An overextended formal apparatus, on the other hand, might obscure the overall interpretation which is, as it now stands, simplified but hopefully clear.

Another possible objection is that the interpretations offered in this paper are often completely ineffective since — as is the case with BO [because] — they assume the presence of a sentence, introduced for the purpose of the interpretation, which is largely unknown. Moreover, the rules for its construction are not specified or even hinted at. This is true, but the fault does not lie with the interpretation or the notation but with our way of speaking. When we say *Watch out*, BO [*because*] *it is slippery*, we have in mind: "It is slippery and if you do not watch out, you may. . . " wherein the threat implied by *you may* is often not expressed at all. It may be sliding and falling on a slippery pavement (in the case of a pedestrian) or skidding (in the case of a driver). These circumstances, usually well known to the interlocutors, are most of the time not stated explicitly precisely because they are known. The ambiguity regarding the implicit threat can be even greater and more difficult to guess than in the case of *Watch out*, BO [*because*] *it is slippery*. When we say *Watch out*, BO [*because*] *it is very windy*, we can — while in the Mazury Lake District — warn against capsizing someone who intends to go sailing. Yet when we say it over the phone to an asthmatic friend in Warsaw, we warn him or her from something entirely different altogether. In none of these cases is the threat specified explicitly, although it may be perfectly clear to the interlocutors.

The conceptual apparatus used here could perhaps be simplified by substituting the relation $L(p, q)$ with the otherwise necessary implication: "$p \overset{o}{\Rightarrow} q$". The reduction of linguistic entailment to strict implication could help eliminate one of the primitive concepts introduced in this paper.

Regarding matters linguistic, it must be noted that a certain number of connectives can feature in a single-word or a two-word form, in the latter case followed by TO [then] and with the sequence of clauses linked by the given connective reversed: p C q = C q TO [then] p, as in "p JEŻELI [if] q" = "JEŻELI [if] q TO [then] p" and "p SKORO [since] q" = "SKORO [since] q TO [then] p," etc.

This paper was written with an eye to a potential application in automated data processing. Such application seems to be possible, although it is

limited and complicated by two factors. The first factor is the occasional ineffective nature of the interpretations given above, that is, an appeal to sentences which are implicitly assumed but not explicitly stated and whose construction cannot be formally specified. The second factor is the fact that in the case of connectives which have several semantic and thus several formal interpretations, such as I [and], the choice of the right interpretation depends on the meaning of the clauses linked by that connective — a fact which is extremely difficult to capture formally. The simplest, although rather primitive, solution would be to give all possible interpretations at the stage of data processing for further post-editing by a human interpreter.

* *
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This paper was subject to many discussions between its author and numerous discussants during private conversations as well as presentations at the Linguistics Committee of the Polish Academy of Sciences in October 1970 and the Polish Semiotic Society in February 1971. It would be hard to mention them all, as it would be to give relative weight to their respective comments and their impact on the quality of this paper. It is thus most justified to mention and thank the most important of these people in the alphabetic order: Irena Bellert, Bożenna Bojar, Janusz Chmieleski, Barbara Klebanowska, Jerzy Kuryłowicz, Witold Marciszewski, Zdzisław Pawlak, Jerzy Pelc, Marian Przełęcki, Helena Rasiowa, Zygmunt Saloni, Barbara Stanosz, and Zuzanna Topolińska.

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Janusz Lalewicz

LANGUAGE, UTTERANCE, SPEECH ACT

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I. UTTERANCE AND THE SENSE OF UTTERANCE

1. When speaking, we are stating, asking or demanding, calling for something, answering to or talking with someone, explaining, declaring, promising, recounting, swearing or requesting. Yet with speaking we are also building sentences, matching words together or creating, and uttering, sequences of linguistic signs. When I say to someone: *pass me the ashtray*, I am building a combination of words while using this very combination to form a request for moving the ashtray closer to me. These are two aspects of the same behaviour: uttering words arranged in a certain order always amounts to telling something to someone, making someone do something, confiding or pleading with someone, or confessing something to someone. And the other way round: we can promise, tell or ask only by uttering words arranged in a particular order. Thus, saying something to someone is on the one hand a realization of possibilities of grammar and vocabulary, a particular use of language, while on the other an activity of relating to someone (by asking, requesting or confessing), engaging in social activity. By its form, speaking, understood as a certain behavior, is a linguistic phenomenon, a usage and/or manifestation of language. By its functions related to social practice, it belongs to the realm of social interactions.

2. In daily circumstances of social life speaking is primarily considered with regard to its function: as a tool for communication and thus a type of social behaviour. Language only determines the form of this behaviour, offers a technique for relating to someone with respect to something. The practice of communication, however, is all about sense. When I decide to speak to someone, what is important both to me and my addressee is what I DO by

uttering words in a certain order, not how this particular order of words was achieved. I am building a sentence to mean something by it, to promise something, in order to do something or explain something, ask for something, demand something or refuse something. Similarly, what somebody says to me is for me, before anything else, a request, a confession or an insult. The words of my interlocutor are used as a tool for relating to me, engaging with me in a particular social interaction, a means of influence. When I am answering the question *What did he say?* I am not usually quoting what was said word for word, I often cannot do it and indeed do not really try, but rather say that he asked me to do this or that, told me something or complained about something. In other words, I am reporting the sense.

3. Naturally, the sense of the utterance depends on its linguistic form, in order to understand what was said I must speak the particular language. But fluency is simply not enough to grasp the sense. When, by chance, I find on the pavement a note that reads *I will be there tomorrow before my shift. Dorota*, I sort of understand the message, my linguistic skills are proficient enough to imagine what KIND of situation I have stumbled upon. But, since I do not know who wrote this, and to whom, I am unable to determine the PARTICULARS: who is going to meet, when, and with whom. Knowing the language, I am perfectly capable of understanding what *I do not want that* means, but if I know little about the circumstances, I am at loss to what can be really meant by that. It could be a refusal (to some sort of a proposal) or confirmation (in answer to somebody's query), a playful coquetry or expression of dislike. The same sentence can be used to mean different things. What it "says" is determined both by the choice of words and particular circumstances (who to whom, in what situation, in what context, in what moment, etc.). Thus, SENSE is what somebody's words "say" in a highly particular context, and which can be contrasted with their MEANING, that is, what is common (from the semantic perspective) to all utterances with an identical linguistic form. In other words, what is determined by semantic rules of language and what can be understood by learning a language.

4. Linguistic communication effectuates through SPEECH ACTS. A speech act: speech act is a complex circumstance where SOMEBODY SAYS SOMETHING TO SOMEONE IN A PARTICULAR SITUATION. One may differentiate between mere SAYING of something from WHAT WAS SAID, or THE UTTERANCE. The latter, therefore, may be further described as WHAT WAS SAID BY SOMEBODY TO SOMEONE IN A PARTICULAR SITUATION. As such, by virtue of being a product of a linguistic system, the utterance is related with language, but it is related with a particular

speech act as well. Consequently, it may be explored in two ways: as a manifestation of a particular linguistic system or as an act of communication, a type of social practice. Differentiation between those two perspectives is important in that it is precisely the use of language that makes speaking a social behaviour. It would be therefore highly inappropriate not to consider or distinguish what in speech is governed by the mechanisms of language alone. As a product of a system of language, the utterance has a certain TEXT, that is, functions as a particular order of linguistic signs, and certain SENSE, that is, "says something." Both text and sense of the utterance are partially determined by the framework of the particular language and partially by the circumstances of the speech act.

As a product of a system of language emerging through application of linguistic means, the utterance is the subject matter of linguistics. A thorough analysis of the utterance, as well as linguistic communication in general, would also need to examine it as a component of social practice. It appears, however, that one should first establish what the utterance is from the linguistic point of view since the mechanisms of speech and how the utterance is built are both explored by linguistics. Rather than introduce an entirely new theoretical framework for the purposes of our present study, we will be rather seeking to put emphasis on a complementary perspective to one adopted by linguistics in its analyses of the utterance.

II. UTTERANCE IN LINGUISTICS

(*LANGUE* AND *PAROLE*)

1. The opposition between a language and the utterance articulated in this particular language is the founding principle of contemporary linguistics. The discipline explores structural aspects of the system of language and its functional mechanism: the speech mechanism. It ignores all aspects of communication considered independent from language, such as the functioning of speech within the social environment. Nikolay Trubetzkoy's Introduction to *Principles of Phonology* starts with an account of differences between phonology and phonetics, thus reflecting the difference between language and the speech act: "Each time that someone says something to someone else there exists a *speech act*. A speech act is always concrete and takes place in a specific locale at a specific time. Its prerequisites are a specific speaker (a 'sender'), a specific addressee (a 'receiver'), and a specific subject matter to which the act relates (. . .) But a speech act has still another prerequisite: (. . .) the existence of a language in the consciousness of the members of a

speech community is the prerequisite for each and every speech act (. . .) Speech events and the system of language accordingly presuppose each other. They are inseparably linked and should be considered as two interrelated aspects of the same phenomenon 'language.' Still, they are quite different in nature and must, therefore, be studied separately" (Trubetzkoy 1961: 1). This "system of language," that is, language itself, is a system of abstract rules (syntactical, morphological, lexical), whereas a speech act is composed of "concrete sound flow" (signifying side) and "concrete communication" (signified side). Phonetics is a "study of sound pertaining to the speech act," while phonology is a study of elements of a phonological system which belongs to the system of language.

2. This opposition between the "system of language" and "speech act" clearly builds on Ferdinand de Saussure's distinction between *langue* and *parole*, although de Saussure is more ambitious in exploring various aspects and levels of this opposition.

1) If speech can be considered as an element of social life, then language (*langue*) is an institution, a set of norms and rules of communication, "purely social and independent of the individual" (de Saussure 1966: 18). *Parole*, in turn, is an "individual act," an individual choice, a concrete manifestation where those rules are applied.

2) Speech is a technique of employing signs for the purposes of communication. From this perspective, language is a "dictionary," a "grammatical system" which "exists in the form of a sum of impressions deposited in the brain of each member of a community, almost like a dictionary of which identical copies have been distributed to each individual" (Saussure 1966: 19), whereas *parole* "is an individual act. It is willful and intellectual (. . .) [where] we should distinguish between: (. . .) [a] the combinations by which the speaker uses the language code for expressing his own thought; and (. . .) [b] the psychophysical mechanism that allows him to exteriorize those combinations" (de Saussure 1966: 14); or "(a) individual combinations that depend on the will of speakers, and (b) equally willful phonational acts that are necessary for the execution of these combinations" (de Saussure 1966: 19).

3)These two descriptions of *parole* are composed of two points highlighting two different oppositions. Point (a) stresses the individual combination of signs that remain in opposition to the "system of signs" in the same fashion as the message remains in opposition to the code. Linking "individual combinations" with a "wilful and intellectual individual act" allows us to recognize it as what we have already identified as an "utterance" in section

I.4.

Point (b) stresses concreteness (physiological, acoustic, etc. aspects) of *parole* in opposition to the abstract nature of the "system of language" which is further described as a form: "the effective link between the phonic and psychological elements," "a series of differences of sound combined with a series of differences of ideas," "the pairing of a certain number of acoustical signs with as many cuts made from the mass of thought" (de Saussure 1966: 120). The form itself is abstract since language (*langue*) "has neither ideas nor sounds that existed before the linguistic system, but only conceptual and phonic differences that have issued from the system" (de Saussure 1966: 120). Precisely this opposition between the concrete and the abstract inspired Trubetzkoy's distinction between phonology and phonetics, as well as the differentiation between FORM and SUBSTANCE proposed by Louis Hjelmslev.

3.Differentiation between abstract units of the system of language (phonemes, morphemes) and their concrete, material form manifested in speech is undoubtedly important and crucial to linguistic perspective. Much like a mathematician examines the pure form of an ellipse while neglecting its physical properties that come with a drawing, or a physicist experiments with a mechanical form of a body described by a number of relevant parameters, thus ignoring such qualities as hue or smell, the linguist will be exploring only those properties of "concrete sound flows" and their constituent sounds that amount to a realization of particular signs and therefore builds their LINGUISTIC FORM.

But when we speak of the utterance understood as "what somebody said," we may still consider it as "an individual combination employed by the user of the language code," and ignore "psycho-psychical mechanism" used for its delivery, rightly judging it as insignificant since the sense of the utterance hinges on how linguistic signs are selected and combined rather than particular idiosyncrasies and tone used by the speaker. Thus, many linguists differentiate between the utterance understood as an arrangement of linguistic signs and the utterance combined with its material (acoustic, articulate) shape. French linguists, such as Émile Beneviste, Eric Buyssens or Gustave Guillaume, use the term "DISCOURS" for an utterance understood as an arrangement of linguistic signs, and reserve the term *parole* for either "phonational act" and/or its product, that is, "concrete sound flow," or SPEECH ACT (*acte de parole*) in general.

4. Like Trubetzkoy, in *A Course in General Linguistics* de Saussure wants to give a precise account of the area of interest of linguistics: by

analyzing the "facts of speech" he seeks to isolate language as a system of communication rules or a system of signs, and to provide an "immanent" description of linguistic system conceived independently from its use. For de Saussure, *parole* is what remains outside the linguistic system, all that is "accidental," changeable and insignificant. For this reason, his account of *parole* is at times not entirely consistent or clear. Nonetheless, taking matters further but without succumbing to contradictions with his thought, one may identify in his considerations three oppositions, also analyzed elsewhere:

a) system of norms (social) — act (individual);

b) system of signs — combination of signs;

c) linguistic form ("system of differences") — its manifestations.

The first two points relate in a sense to the same pair: LINGUISTIC SYSTEM — WHAT IS SAID, analysable in two aspects, as an activity and its product: LINGUISTIC NORM — SPEECH ACT and LINGUISTIC SYSTEM — UTTERANCE (*discours*). In the third point, however, the emphasis is put not on the contrast between the system of communication and the act of communication, but on one between the linguistic form of communication tools and their material embodiments. This latter opposition is present both in the system and the utterance. Although de Saussure and others, like Trubetzkoy or Hjelmslev, tend to emphasize it while differentiating *langue* and *parole*, in view of matters discussed in this paper it appears to be insignificant and will not be taken into further consideration.

Thus, setting aside concrete manifestations and embodiments of linguistic signs, we will be dealing primarily with the following opposition: system of signs (*langue*) — utterance (*discours*). Since the utterance is meant here not as a simple combination of signs but a combination addressed by somebody to someone, that is, not merely as a product of a linguistic system but also as a part of an act of communication, we can set up the following tripartite division:

SPEECH ACT	UTTERANCE	LANGUAGE
(*acte de parole*)	(*discours*)	(*langue*)
= saying (of something)	= thing spoken	= linguistic system
	PAROLE	*LANGUE*

III. LINGUISTIC SYSTEM AND THE SENTENCE

1. Primary empirical material in analyzing linguistic communication is "what is said," or speech acts and the ensuing utterances, or what de Saussure uniformly labels as *parole*. For a linguist, this constitutes a point

of departure for reconstruction of the linguistic system (*langue*). Thus, he treats the utterance as a manifestation of the system, although, certainly, it is not its exclusive or predominant value. But since linguistic research aims to describe the language of the utterance, it leaves out other extra-linguistic factors from the inquiry. What is, then, an utterance as a product of language?

In *Fundamentals of Language*, Roman Jakobson and Morris Halle write: "speech implies a selection of certain linguistic entities and their combination into linguistic units of a higher degree of complexity. At the lexical level this is readily apparent: the speaker selects words and combines them into sentences according to the syntactic system of the language he is using; sentences are in their turn combined into utterances" (Jakobson, Halle 1956: 58). Thus, "the given utterance (message) is a combination of constituent parts (sentences, words, phonemes, etc.) selected from the repository of all possible constituent parts (code)" (Jakobson, Halle 1956: 61). This description shows how "the speaker uses the language code," how the text of the utterance emerges. Understood in that way, the utterance is in a sense a realization or manifestation of the linguistic system: subsequent acts of selection and combination are determined by a repertoire of linguistic units and rules that govern their merging into utterances.

The lexical repertoire and rules of syntax are not determining selections and combinations in any specific way, they simply account for those that are possible. In other words, they determine permissible combinations available for building components of the utterance. Sets of toy blocks are designed to enable building larger structures, but the mere combining of blocks does not determine how the structure ultimately looks like. But one needs to know what one wants to build — for example a house rather than two towers — before choosing specific blocks and combining them accordingly. In a similar vein, the selection and combination of linguistic elements into a text of the utterance is determined by what one wants to say. In this sense, a linguistic system does not "generate" the utterance, as it is often said, but only provides combinations that serve as its components.

2. The process of building an utterance proposed by Jakobson follows a different direction than linguistic analysis, which breaks down texts into sentences, sentences into syntagms, syntagms into morphemes, and, finally, morphemes into phonemes. Description of the linguistic system includes an inventory of units appearing on each level of analysis and characterizes horizontal as well as vertical relationships occurring between the units. Analytical procedures are establishing meaningful oppositions between units

of the same level (that is, substitutable units appearing in a combination constituting a higher-level unit) as well as their possible configurations in which they may be combined into higher-level units. Characteristics of a given element of language, that is, characteristics of opposition towards other elements and combinations in which they can be arranged, constitute for the speaker the rules for use of such an element. In this sense, the speaker is constrained by an available repertoire of possible units and combinations determined by the linguistic system, and which can be further used in the process of composing an utterance.

However, the selection made by the speaker is not only determined by the repertoire of combinations available at the given moment as units of the lower level must be arranged in such a way as to form a unit of the higher level. Subsequent phonemes are purposefully selected to build a morpheme, and such morphemes must be chosen to fit as a component of a word. The element is chosen as a functional component of the higher-level unit, which means that the choice regarding the use of such a higher-level unit determines the choice of lower-level units used as its building material. For example, the choice of words is logically preceded by the choice of its constituent phonemes, since one is choosing not a combination of phonemes, but words, which only happen to be combinations of phonemes. Thus, we cannot speak of selecting and combining phonemes into morphemes in such sense as it is said with regard to selecting and combining words into sentences. In principle, one selects and combines signifying units, morphemes and words, and this operation is already synonymous with the selection of their phonological form.

On the other hand, it is equally difficult to speak of selecting sentences, further combined into utterances. It is not so that the speaker has a repertoire of sentences to choose from. There is also no system of syntactic rules to determine possibilities and available types of combinations of sentences. Sentences are composed and put next to each other.

Thus, the selecting and combining of processes happens at the level of signifying units, morphemes and words. Words (or morphemes) are not CONSTRUCTED, but GIVEN along with their phonological form. Sentences, in turn, are not given as a set of alternative units with a particular morphological form, but constructed as a result of the selection and combination of morphemes.

3. Therefore, from the linguistic perspective, sentence is a combination of morphemes which is not determined in advance by the rules of the linguistic system . As a whole, it transcends grammatical determination, although the

rules of grammar govern each selection and combination within the sentence internally. The linguistic system determines the structure of morphemes, it is known in which combinations phonemes can merge to form particular morphemes, but it does not determine the form of sentences. Older grammars indeed propose a schematic structure of sentence, but those definitions are based on the subject-predicate model, first introduced by the ancients to pursue logical-grammatical inquiries seeking to express the truth-value of logical propositions, and for this reason their character is normative rather than descriptive. Today, description of sentence puts greater emphasis on its communicative function. To quote Serge Karcevski, "sentence is an actualized communicational unit. It has no grammatical structure of its own (. . .) Any word or concentration of words, any grammatical form and any interjection, can, if the situation so requires, serve as a communicational unit" (Karcevski 1931: 189). Alan Gardiner describes a sentence as "a word or set of words revealing an intelligible purpose" (Gardiner 1951: 98).

Discussing the levels of linguistic analysis, Émile Beneviste shows that the sentence eludes description in purely linguistic categories because, taken as a whole, it is not an element of the linguistic system. Each linguistic unit possesses a specific form and a specific sense[1] established under the rules of the system (Beneviste 1971: 101—112). Beneviste argues that FORM of the given unit can be defined as a selection and combination of its constituent units belonging to the lower level of the system, whereas SENSE is the place of the given unit in a combination that constitutes a unit belonging to the higher level of the system. For example, the form of the morpheme *cat* can be defined as a particular arrangement of phonemes /k/, /æ/ and /t/, while sense of this morpheme is expressed by its ability to fulfill particular functions in a sentence. Formally, a morpheme is a combination of phonemes, while sentence is a combination of morphemes, whereas in terms of sense phoneme is a functional component (*intégrant*) of morpheme, while morpheme is a functional component of a sentence.

But the phoneme is not composed of linguistic units and thus cannot be further broken down into smaller segments. Consequently, it has linguistic sense, but lacks linguistic form (although, generally, it does possess a form secured by its distinctive features). A sentence is the most complex linguistic structure since there are no linguistic units composed of sentences (as a LINGUISTIC COMBINATION, utterance is not just a unit that is more complex than sentence, but constitutes a sequence of sentences). Consequently, a

[1]Beneviste uses the term "meaning" — translators note.

sentence is devoid of linguistic sense. "When we say that a certain element of a language (. . .) has a meaning, we mean by this a certain property which this element possesses (. . .)[,] forming a unit which is distinctive, contrastive, delimited by other units, and identifiable for native speakers for whom this language is language" (Beneviste 1971: 108). It is "inherent in the linguistic system and its parts." This "linguistic" sense, emerging, as it were, inside language is inherent to its elements: phonemes and morphemes. The sentence lacks such sense and thus cannot be regarded as a linguistic unit: "with the sentence we leave the domain of language as a system of signs and enter into another universe, that of language as an instrument of communication, whose expression is discourse. There really are two different universes here even though they take in the same reality, and they give rise to two different linguistics, even though their paths cross all the time" (Beneviste 1971: 110).

4. An utterance is composed of a sentence or a sequence of sentences. A sentence is the smallest independent tool for communication: when I want to request something from somebody or ask for something, inform somebody or entrust something to somebody, I must use a sentence, or a sequence of sentences. Thus, a sentence can be described in relation to its usability in communication. Gardiner suggests that "an utterance is a sentence when the speaker can be recognized as having put into it, taken as a whole, all that is necessary for conveying an intelligible purpose" (Gardiner 1951: 236). Precisely, the sense of a sentence lies in its intelligible purpose, or what is meant. With *Give me a cigarette!*, one issues a demand for a cigarette, with *Can I have a cigarette?*, one asks for a cigarette, and with *Can I have a cup of tea?* one asks for a cup of coffee.

This conception of sense differs from "linguistic meaning" discussed by Beneviste (which, following de Saussure, can be understood as the functional value),as well as from meaning attributed to morphemes (linguistic signs) or any other types of signs. From this perspective, meaning is a property of a morpheme (or word) that institutes it as a component of an utterance, and which causes that the appearance of a morpheme in any given utterance determines its sense in a particular (describable) and (universally) fixed manner.

Both linguistic disciplines discussed by Beneviste "take in the same reality," but express two different perspectives. A single product of language — a sound, a word or a sentence, — can be examined from any of those viewpoints, but it will appear differently if considered as an element (or combination of elements) of the system rather than analysed as a component of the utterance. Since meaning organizes the system of language,

morpheme (linguistic sign), the smallest component of language equipped with MEANING, must be considered as a fundamental element of language. And since utterance is a tool for communication, and SENSE organizes the utterance, sentence, the smallest component of the utterance equipped with sense, must be considered as the fundamental element of the utterance. The domain of language (*langue*) encompasses all things ruled by the linguistic system: morphemes (linguistic signs), morpheme constituents (phonemes) and combination of morphemes (words, syntagms). The domain of utterance (*discours*) encompasses all things serving the communicative purpose of the speaker: sentences, sentence constituents (words) and combinations of sentences (utterances).

IV. REFERENT AND THE MEANING OF UTTERANCE

1. If, browsing through a handbook of grammar, I happen upon a sentence *Dostałem wczoraj list z Paryża* [*Yesterday I received a letter from Paris*], used here to illustrate some kind of a syntactic rule, I understand its sense in a particular way, that is, only inasmuch as it is determined by semantic rules governing the particular language, or, more precisely, by the meaning of lexical and grammatical means employed in this particular sentence. It does not really tell me anything, but I know what it would tell me and what could be meant by it. By analogy, the word list [*letter*] does not indicate anything in particular, but it is perfectly SUITABLE to do so, namely indicate a thing described under this entry in the dictionary. In communication, the meaning of a word, as well as what by extrapolation can be treated as the meaning of a sentence (or rather combination of words capable of functioning as a sentence) is potential and formal in nature. What can be indicated (or said) by means of a particular word (or combination of words) is determined only in opposition to what can be indicated (or said) by the use of other words or combination of words. As a Polish-speaking individual, I know what kind of things can be indicated by the word list [*letter*], and therefore know what kind of objects could be referred to in the above sentence, although it must be noted that my knowledge is limited to how objects are categorized in a given language. For example, if I were to translate this sentence into French, I would not be entirely sure whether it would have to be *Hier, j'ai reçu une lettre de Paris* or *Hier, j'ai reçu la lettre de Paris*.[2]

[2]In Polish there is no gramatical differentiation between definite and indefinite articles. Therefore, phrased in its original Polish version, the sentence at the beginning of

2. When engaging in verbal communication, we are not relying on a purely functional system: the use and understanding of linguistic forms is also shaped by a number of secondary systems that introduce rules modifying lexical and grammatical means used in certain situations or by particular social groups. Imagine we are encouraging someone to treat himself with a drink or a snack.

In various environments there are systems employed to modify meanings of words as well as the manner of use and scope of syntactic means that shape phonetic or graphic realization of the utterance. Those systems are often described as connotative systems or secondary modelling systems. Some authors go as far as to speak of various languages (scientific language, literary language, standard language, female language, teen vernacular, etc.), symbolic meanings or domains where expressions have highly specific meanings. To understand what is meant by "flunk an exam," "break up the text," "derive an equation" or "uniform continuity," it is not enough to master the system of language, one also needs to grasp the secondary system governing the meaning of those expressions.

3. The meaning of a given expression, both one established by the functional system of language and one determined under secondary systems, is REALIZED or ACTUALIZED in circumstances in which the particular expression occurs. In the case of speaking this happens in relation to the circumstances of the speech act. Things are spoken in a particular social and natural environment: at a certain point in time and space, among people and objects within the reach of one's perception. One speaks to a particular person in a particular social situation, for example as a family member or a casual companion on a train, as one's superior or friend, while engaging in small talk, as a defendant, an examinee or a partner in discussion. The circumstances of the speech act fill the background of one's discourse and feed the message where it may appear to be incomplete.

Under the rules of the system developed in the English language, the expression *all children* should denote all elements of a class of objects called children. But when the teacher urges the class: *All children are writing!*, he means only those elements of the class that are present in the particular room. When, upon walking into an office, I say *Can I speak to the director?*, the person spoken to exactly knows who I have in mind, although, under the rules of English, all my query reveals is that I am inquiring about a

this section does not provide a clue whether the speaker means *a* letter or *the* letter. In its translation to English, however, the problem no longer exist, as the use of articles in English and French is based on a similar mechanism — translators note.

certain individual belonging to a class of directors. This is so because the circumstances of the speech act distinguish a set of objects that collectively constitute a FIELD OF REFERENCE for my utterance (or its components): a set of objects functioning as possible referents in this particular moment of communication. From a range of possible referents of any given utterance, linguistic meaning of the word *director* indicates objects that exercise a particular social function. But for a person working in this institution, a *director* constitutes a proper name of sorts, standing out as the only member of staff fulfilling a particular social function. Similarly, there is no point in me saying *Can I speak to the officer?* because in most institutions there is more than one individual who enters this field of reference. The person to which I would direct my query would know WHAT KIND of person I seek but would be unable to IDENTIFY him in person.

The field of reference, that is, a set of selectable objects designating the referent of the expression, depends naturally not only on the particular situation of the speech act, but also on its subject matter, character and linguistic meaning. When we talk about the weather, *sun* functions as a proper name as distinguished from the stars, the moon and the clouds, but during a lecture in astronomy, where the field of reference encompasses all sorts of celestial bodies, not least various suns, it will designate only a class of objects.

4. The locale, time, inanimate and human environment in which the speech occurs are independent from what is spoken. The speech act is EMBEDDED in a particular space and time, one formulates an utterance in the GIVEN, pre-established, circumstances. But those more or less immediate circumstances penetrate the utterance and become structured in a speech act. In a theatrical review, one particular performance would be described as follows: "on 6^{th} May 1970, the National Theater in Warsaw premiered *A Midsummer's Night Dream*," but on the next day members of the audience may simply refer to it as "yesterday's premiere." The speaker would not adopt the established calendar but rather use a timeline where *now* divides the past from the future, and employ a scale to mark particular points in time (*yesterday*, *the day before yesterday*, *last year*, *a moment ago*, *in a moment*, *soon*, *long time ago*, etc.), with the speech act being a temporal point of reference. The same goes for space, places indicated by such expressions as *here*, *there*, *far*, *nearby*, *at the back*, *to the right*, etc., are all established in reference to the speech act: *here* means *the point in space where the utterance comes from.*

In a way, a speech act also organizes the human universe by singling

out two persons: ME, that is, HE, WHO SPEAKS; YOU, that is, HE, TO WHOM IS SPOKEN; and HE, THEY, that is, THOSE OF WHOM IS SPOKEN. This pattern is further employed to organize the entire world of things-spoken-of that contains MINE or YOUR elements as opposed to all others things.

The in-the-world happening of the speech act transforms it into the world-of-the-utterance organized around the speech act and the involved actors. While speaking, I am approaching the world subjectively, as being referred to in my utterance, SPOKEN by me. And since my words and my speaking self-constitute the point of reference of this world, the perspective is untranslatable to any objective experience, that is, one where my speaking self and things spoken of are perceivable as objects. Someone accidently hearing the following recording: *Your brother told me about her yesterday*, and ignorant of the situation and characters spoken of in this particular speech act, is unable to locate the reference, that is, identify the particular place, time and persons involved. In a similar vein, geographical coordinates are not enough to locate the particular point in space if one does not know how to identify the zero point of the coordinate system.

V. SPEECH ACT

1. Uttering words arranged in a certain order is a manner of actualization or realization of their meaning, but can also be treated as a certain behaviour towards somebody. The sense of WHAT WAS SPOKEN TO SOMEBODY is determined not only by the actualization of lexical and grammatical means, but also by the very fact THAT it was spoken. In the preceding section we have discussed the sense of an utterance determined by WHAT was said: by the semantic side of the linguistic form and its actualization, that is, its interpretation in a frame of reference established by the circumstances of the utterance. A speech act, however, is not merely a form in which one relates to the particular subject matter — or things spoken, — but also functions as a certain linguistic behaviour. Gardiner insists that "every sentence embodies two distinct, though independent purposes, the one affecting the thing or things spoken about, and the other affecting the way in which the listener is to receive or react to what is said" (Gardiner 1951: 240). The speech act, and the sense of the utterance, manifests therefore two things: how the speaker relates to what is said, and how he relates to the addressee.

This social-practical, or, to borrow from Charles Morris, pragmatic aspect of meaning is emphasized by conceptualizing the speech act through such notions as SENDING and RECEPTION. Those notions, much like

coding and decoding, involve operations on signs and do not directly imply any relationships that may occur between those engaging in the process of communication. The sender produces or transmits certain arrangement of signs, the receiver is on the receiving end of this transmission. I am a receiver of a shop sign, a tram number, or a no-entry road sign. With these operations, I am examining those arrangements of signs as standalone entities, without any reference to the producer of the message. But, while engaged in a conversation, I am dealing not only with a certain arrangement of signs (the text of the utterance), but also with a particular behaviour directed towards myself. This is so because speaking implies not only a relationship between people and signs, but also personal relationships between speakers and those meant to respond.

Speaking is different from other modes of communication (such as road signs, bus numbers or traffic lights) in that, apart from the RECEIVER, it also implies an ADDRESSEE — one spoken to. Strictly speaking, traffic lights have no addressee — one can speak here of reception only. What is spoken, however, is always spoken to somebody, engages someone in a personal relationship. Therefore, one needs to distinguish the addressee — one to whom is spoken, that is, someone asked or queried, someone affected by words, and the receiver, that is, someone who hears the utterance addressed to someone else and who receives it not as a particular behaviour towards oneself, but simply as a mere arrangement of signs. In that vein, Yago's words are reaching the audience, but it is Othello and his passions that he wishes to address.

2. By approaching someone I am introducing this person to a certain social context where he has a special social role to fulfill, namely that of my interlocutor. I am thereby establishing a personal relationship which manifests itself as a relationship between YOU and ME. The category of person is a linguistic manifestation of a relationship between the one who speaks and the one spoken to. While speaking, I am referring to myself as I and to my interlocutor as YOU. I "is 'the individual who utters the present instance of discourse containing the linguistic instance I."' Accordingly, "you (. . .) [is] the 'individual spoken to in the present instance of discourse containing the linguistic instance you."' (Beneviste 1971: 218). As it is, this relationship is not reflecting something established prior to and beyond the speech act, but constitutes a manifestation of what this act by itself creates and what can be not only described but also exists exclusively by virtue of the reality of speech. In the speech act, of which I am a subject, I am not only DESCRIBED AS I, but I INSTITUTE MYSELF AS I, make myself,

or become a subject (ME) — a subject in the broadest possible meaning of the term.

Subjectivity is often described in two ways. On the one hand, subject emerges in opposition to an object, a thing, a "being-in-itself," it is a "being-for-itself," both awareness and self-awareness. On the other hand, it is a self-sense, awareness of being oneself in opposition to others, being ME in relation to the Other, to YOU. When I speak, I put myself in place of a subject in both of those senses: it is SOMEONE who speaks — an opposition to something, but also ME — an opposition to SOMEBODY ELSE. "The 'subjectivity' we are discussing here is the capacity of the speaker to posit himself as the 'subject.' It is defined not by the feeling which everyone experiences of being himself (this feeling, to the degree that it can be taken note of, is only a reflection) but as the psychic unity that transcends the totality of the actual experiences it assembles and that makes the permanence of the consciousness. Now we hold that that 'subjectivity,' whether it is placed in phenomenology or in psychology, as one may wish, is only the emergence in the being of a fundamental property of language. 'Ego' is he who says 'ego.' That is where we see the foundation of 'subjectivity,' which is determined by the linguistic status of 'person." (Beneviste 1971: 224).

By analogy, when I speak to someone — to whom I refer as YOU — I am imposing on this someone a status of the Other Person, one that I seek to address. The significance of this role in social life is reflected in norms that determine forms and conditions to be satisfied in an act of verbal communication. And, indeed, sometimes "we are not on speaking terms with someone," and refuse to be bound with THE OTHER in a relationship established by the speech act.

3. By speaking to someone, I am not only establishing a personal relationship between myself and the addressee, I am also embarking on an action with respect to that person, reaching out to that person. Most theories of language and communication, particularly those with older dates but still popular today, consider speech as a means for "expression" of thought and emotion, or a "transfer" of information or experience. In other words, by this account speech is secondary and passive, determined by a primary reality with a better title to be "real," this being thought, consciousness, experience or a thing which it seeks to represent, much like portrait serves only to depict a flesh-and-blood person. The utterance is therefore but a reflection of what goes on between the people, an epiphenomenon of sorts. Consider, however, that when I say *I am hereby opening the meeting*, *I promise to be*

on time, *I appoint N. N. as my deputy*, then what I do by uttering those words has not only a descriptive value of things transpiring in the social world, but I am in fact DOING IT by these very words, that is: open a meeting, make a promise and appoint someone (Austin 1963). By saying *At ease!* or *Would you be so kind to pass me the sugar?* I am either issuing a command or forming a polite request. A request, command, appointment, oath or opening of a meeting are all social actions, acts that are establishing or actively shaping personal relationships. The same happens at a wedding when two people exchange vows, while joining an organization, insulting someone or greeting somebody. It is an act of a SOCIAL nature, that is, one which takes place in the realm of social relations, and thus belongs to the sphere of PRAXIS, as compared to POIESIS, which takes place in the realm of things. As it happens, a great deal of actions belonging to the sphere of praxis is done by means of speaking or other ways of communication.

On the face of it, this pragmatic aspect of the utterance evaporates when we recount events or describe something, as in confessions, storytelling or simple sentences containing information. But I say *It's almost five o'clock* or *You've dropped your glove* not merely because the clock points at a specific moment in time or I see the glove falling, but because I want to confront someone with something, suggest something, make someone do something, or, as in storytelling, take someone as a witness to my argument, make someone sympathetic to my point of view, justify something in somebody's eyes or impose my own perspective. Naturally, this social function is less clear and immediate during a lecture in quantum theory or a story narrating our holiday adventures than in a command or a "performative" act, but this dimension is always present somewhere in the sense of the utterance.

4. This fundamental differentiation of various ways of relating to or influencing someone happens already on the level of grammar, where one distinguishes between indicative, interrogative, imperative and, sometimes, exclamatory sentences. Three sentences: *You will visit me tomorrow*, *Will you visit me tomorrow?* and *Visit me tomorrow!* reflect three different attitudes of the speaker towards the addressee (notification, question, bidding) in the same area of interest or subject matter (your coming to me tomorrow).

At the level of an utterance taken as a whole, such differentiation shows much greater complexity. A statement in the imperative (as a standalone utterance, not a constituent of a larger utterance) can express an order, asking for a favour, more or less formal request or a demand. With the statement in the indicative we narrate, declare, notify or describe. This "modality" of the utterance is incidentally independent from the modality

of its constituent parts. I can demand something in the imperative, but the indicative and interrogative might as well fit this same purpose (*You're bringing it home tomorrow*, *Would you be so kind to pass me that book?*). An order can be easily phrased in the indicative, and we are free to narrate something by introducing interrogative elements to the story.

Similarly to the level of sentence, where the attitude of the speaker can be expressed by means of grammar where formal markers of this attitude shape the structure of the sentence, at the level of the utterance there also occur formal markers that indicate particular functionality of the utterance. For them to be recognized as such, orders, expositions, announcements, reports or rulings must all be structured according to rules uniquely prescribed for these types of expressions. On a side note, literary genres constitute a good, and thoroughly explored, example illustrating functional differentiation of expressive forms.

Ordinary language abounds with terms characterizing what is said (utterances and/or speech acts) in connection with its function within the realm of social practice: confession, confiding in someone, gossip, libel, joke, prank, explanation, making the case for something, etc. All those forms and modalities of verbal communication, intuitively grasped in the regular communication, can only be briefly sketched here, as, as far as I can tell, they have never been studied in a systematic way. One of the crucial tasks in the functional description of the utterance, and linguistic communication in general, would be, it seems, to analyze those descriptive terms and systematize distinctions they appear to be implying.

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ACTUAL, POTENTIAL, HABITUAL AND UNIVERSAL MEANING OF THE POLISH VERB IN THE LIGHT OF THE CATEGORIAL MEANING OF PRESENT-TENSE FORMS

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Tense — the fundamental grammatical and semantic category of the verb in the function of the predicate — conveys the relationship between the moment of utterance and its content.[1] In accordance with such understanding of this category, the present tense expresses facts occurring at the moment in which the utterance is made (which is the primary function of the present tense). Both the moment of utterance and the present facts have their duration in time. The duration of the facts is usually longer than the duration of the utterance. Due to this, the boundaries of the present time, and consequently the boundaries between the present and the past, are blurred. The place of the present in the framework of the grammatical category of tense cannot be defined in a strict manner.

[1] Such definition of this category is correct only with respect to absolute time. It is not necessary to introduce the concept of relative time in the current article. A detailed interpretation of grammatical tenses (chiefly the relative ones) of verbs is presented by, among others, Reichenbach (1948: 287-298). In order to explicate particular units of the category of tense, he uses the concepts of the point of speech, point of event and point of reference. By the point of speech he understands the point in time when the utterance is spoken; the point of reference is the period which elapses between the point of event and the point of speech. In the case of the present tense, all three time points are concurrent.

A verb in the present tense occurring in the primary function has actual meaning, e.g. *Jan pisze list* [*John is writing a letter*].[2] The present tense also serves to convey facts which are not occurring at the moment in which the utterance is made. A verb in the present tense in this function (which is the secondary function) has a non-actual meaning[3], e.g. *Jan chodzi do szkoły muzycznej dwa razy w tygodniu* [*John goes to the conservatory twice a week*].

The actual *vs.* non-actual opposition of meanings is possible for a given verb only in the present tense because, in accordance with the above understanding, verbs used exclusively in the present tense can have actual meaning.[4] As a result, the scope of semantic observation is limited to imperfective verbs.

Some Polish verbs, e.g. iterative verbs like *pisywać* [*to write repeatedly*] or *chadzać* [*to go repeatedly*], have exclusively non-actual meaning; non-actuality is a constant semantic category of such verbs.[5] The non-actual meaning of all other verbs, which do have actual meaning, is their secondary feature, which is revealed in the context. Veracity of this thesis is substantiated by the systemic opposition: iterativity *vs.* non-iterativity = non-actuality *vs.* actuality; e.g. the verb *pisywać* (in the system) has the feature of iterativity and a non-actual meaning, whereas the verb *pisać* [*to write*] (in the system) does not have the feature of iterativity and has an actual meaning. A non-iterative verb may occur in the position of neutralisation (that is in non-actual meaning) exclusively in the context, e.g. *pisać czasami* [*to write from time to time*] = *pisywać*.

[2] Translation of example sentences is provided for the convenience of the English-language reader. While every care is taken that the translation reflects the Polish example accurately, considerations found in this essay refer to the Polish sentences and to the grammatical structure of the Polish language (translator's note).

[3] An entirely coincidental concurrence of the fact expressed by the verb in the non-actual meaning with the moment of utterance is possible: e.g. an utterance: *Jan je śniadanie codziennie o siódmej rano* [*John eats breakfast at seven o'clock every day*], is spoken at seven o'clock in the morning.

[4] The issue of relative actual meaning has been intentionally omitted as irrelevant to the opposition of meanings under consideration here. Such meaning can be evinced by a verb in the past tense (e.g. *Widziałem, jak Jan wskakiwał do tramwaju* [*I saw how John jumped into a tram*]) or the future tense (e.g. *Andrzej będzie śpiewał, jak siostra zagra na fortepianie* [*Andrew will sing when his sister plays the piano*]). Cf. Křižková (1958).

[5] This feature is evinced by the perfectives (often with prefixes: *do-*, *na-*, *prze-*) in the simple future tense (e.g.: *Jan dorzuci ten kamień do rowu* [*John will throw this stone to the ditch*], *Brat przebiegnie 100 m w ciągu 10 sekund* [*The brother will run 100 m in 10 seconds*], *Babcia napracuje się w ogrodzie* [*Granny will work hard in the garden*]). For the issue of non-actual meaning of perfective verbs, see Kopečný (1949).

In the present article, the subject of our considerations are non-actual meanings of only those verbs for which the actual *vs.* non-actual opposition of meanings is possible. The difference between those meanings lies exclusively in the difference between the feature of actuality and non-actuality, provided that the given real meaning of the verb is identical in both its applications. For instance the sentences: *Jan teraz pływa żabką* [*John is swimming breaststroke now*] and *Jan zawsze pływa żabką* [*John always swims breaststroke*] express the opposition between actual and non-actual meaning of the verb *pływać* [*to swim*]. This verb has identical real meaning in both applications, generally definable more or less as "moving in water using arms and legs".

The opposition of actual *vs.* non-actual meaning of the verb *leżeć*, however, does not occur in the sentences: *Jan leży nad Wisłą* [*John lies by the Vistula*] and *Warszawa leży nad Wisłą* [*Warsaw lies by the Vistula*], because the verb *leżeć* [*to lie*] is here used in different real meanings: the first one refers to "John assuming a recumbent position", while the second conveys the "constant spatial location of Warsaw".

Grammatically correct Polish sentences are often ambiguous. A verb functioning as the predicate of a given sentence may have either actual or non-actual meaning. In the Polish language, neutralisation of the opposition between actual and non-actual meaning is a regularly occurring phenomenon.

Veracity of those theses is substantiated by the semantic analysis of the following example sentences:

Jan pływa żabką = 1) John is swimming breaststroke now (actual meaning); = 2) John has the habit of swimming breaststroke; he always does it (usually, often) (non-actual meaning); = 3) John can swim breaststroke (non-actual meaning).

Andrzej gra na fortepianie = l) Andrew is playing the piano now (actual meaning); = 2) Andrew often (sometimes) plays the piano; he is a pianist (as an amateur or professionally) (non-actual meaning); = 3) Andrew can play the piano (non-actual meaning).

Koń je siano = l) The horse is eating hay (actual meaning); = 2) The horse (usually) eats hay (non-actual meaning); = 3) Every horse eats hay (= lives on hay) (non-actual meaning).

Jan pływa od dziesięciu lat = 1) John learnt to swim ten years ago (non-actual meaning); = 2)) John has had the habit of swimming for ten years; he does it often/sometimes (non-actual meaning); = 3) John

has been a sailor (professionally) for ten years[6] (non-actual meaning); = 4) John the sailor has been at sea for the last ten years (and is at sea in at the present moment) (actual meaning).[7]

In the earlier part of this article, non-actual meaning of a verb has been defined in a simplified manner, that is as the meaning opposite to actual meaning. However, non-actual meaning conveys widely divergent facts of reality, whose only common feature is the absence of concurrence with the moment of utterance.

An analysis of non-actual meanings of a verb makes it possible to differentiate: a) universal meaning, b) potential meaning, c) habitual meaning.

Universal meaning of the verb is revealed in sentences which contain a great quantifier, that is those which convey constant facts or always-continuing events. These are usually gnomic sentences, expressing proverbs, maxims, aphorisms, general and timeless truths or scientific theorems,[8] for instance *Ziemia kręci się dookoła Słońca* [*The Earth revolves round the Sun*]; *Człowiek ma dwoje oczu* [*A human being has two eyes*]; *Ryba oddycha skrzelami* [*A fish breathes through gills*]. Universal meaning springs from the knowledge of reality; hence the syntactic indicators of this meaning, such as *zawsze* [*always*], *każdy* [*every*], *wszyscy* [*all*], *żaden* [*none*], can be removed from the superficial structure of sentences.

Verbs in universal meaning often denote constant, natural characteristics of the entire class of living beings. Antithetical compound sentences can be context indicators of this meaning of the verb, e.g. *Człowiek chodzi, ryba pływa, a ptak lata* [*A human being walks, a fish swims, whereas a bird flies*]; *Owady latają, a ludzie chodzą* [*Insects fly, while people walk*]; *Wąż pełza, a żaba skacze* [*A snake slithers, while a frog hops*].[9] Potential meaning of the verb points to the subject's ability to perform an action. If in a given sentence the verb has potential meaning, this sentence can usually be explicated in the most simple way by using the formula "X can...", for instance: *Jan jeździ samochodem* = John can drive a car; *Jan pływa żabką z szybkością*

[6] In Polish, the verb *pływać* means both *to swim* and *to sail* (translator's note).

[7] Explications of the meanings of verbs in the example sentences are cursory and do not take under consideration all other semantic features apart from actuality and non-actuality. The aim of those explications was limited to demonstrating the neutralization of the opposition between actual and non-actual meanings of the verb.

[8] This issue is mentioned in passing by e.g. E. Koschmieder (1934: 84-96), referring to the analysis of aspect.

[9] Subjects of such sentences always have a plural meaning, regardless of whether they are used in the singular or in the plural.

50 m/min = John can swim breaststroke with a speed of 50 m per minute; *Andrzej biega szybciej niż Wojtek* = Andrew can run faster than Wojtek;[10] *Dziecko już chodzi od miesiąca* = the child has been able to walk for a month.

Habitual meaning of the verb expresses such facts or recurring events, whose absolute (aggregate) frequency is indefinite. For instance in the sentence: *Jan gra w karty codziennie* (*często*, *dwa razy w tygodniu*) [*John plays cards every day* (*often*, *twice a week*)] the verb *grać* [*to play*] has habitual meaning; it expresses repetitive facts, whose absolute frequency is indefinite. A verb in the habitual meaning cannot be joined with a determiner of absolute measure, which would convey the meaning "how many times altogether".

Recurrent facts or events expressed by a verb are often a characterisation of the subject, who is a constant (e.g. professional) doer of the action[11] or carrier of the feature, e.g. *Jan pali papierosy* [*John smokes cigarettes*] (= is a smoker); *Kapitan Kowalski lata na śmigłowcach* [*Captain Kowalski flies helicopters*] (= is a pilot): *Franciszek robi buty* [*Francis makes shoes*] (= is a shoemaker); *Alina śpiewa piosenki na festiwalach ogólnopolskich i międzynarodowych* [*Alina sings songs during festivals at home and abroad*] (= is a singer).

Habitual meaning of the verb can usually be explicated in the most simple way by using the formula "X is so that…", or, substituting this formal with synonymous explicative formulas, "X has the feature of…", "X has a habit of…", for instance: *Jan pisze książki* [*John writes books*] (= John is so that he writes books); *Jan wstaje o siódmej* [*John gets up at seven*] (= John has the habit of getting up at seven); *Jan słucha często radia o północy* [*John often listens to the radio at midnight*] (= John has the habit of often listening to the radio at midnight); *Jan nie pije alkoholu* [*John does not drink alcohol*] (= John is so that he does not drink alcohol); *Ten ołówek dobrze pisze* [*This pencil writes well*] (= This pencil has the feature of writing well).

The sets of permissible values for the subjects of sentences with verbs (predicates) used in habitual meaning are not limited to animate substantives. Non-animate substantives can also be the subjects of such sentences, e.g. *Prom ze Świnoujścia do Szwecji pływa dwa razy w tygodniu* [*The ferry from*

[10] The cited example sentences are ambiguous. For the sake of clarity, only the potential meanings of verbs have been explicated.

[11] The issue of constant and concurrent doers of actions is mentioned in Wierzbicka (1969: 159-176), and in passing , referring to the analysis of aspect, in Wierzbicka (1967).

Świnoujście to Sweden sails twice a week]; *Maszyna produkuje tysiąc żyletek na godzinę* [*The machine produces a thousand razors per hour*].

Hence the semantic roles (that is the real relations of noun designates to predicate designates) may be different for different nouns which are sentence subjects. For instance, a noun functioning as the subject may have the semantic role of: a) an agent, e.g. in the sentence: *Jan pływa dwa razy w tygodniu* [*John swims twice a week*]; b) the causer of the action, e.g. in the sentence: *Jan jeździ samochodem do biura* [*John goes to the office by car*]; c) the quasi-agent, e.g. in the sentence: *Samolot do Paryża lata raz na tydzień* [*The airplane to Paris flies twice a week*]; d) the instrument of the action, e.g. in the sentence: *Ta stalówka cienko rysuje* [*This nib draws a thin line*].

Semantic analysis of grammatically correct ambiguous sentences shows the neutralisation of the opposition of actual *vs.* non-actual meaning. Non-actual meaning conveys entirely different facts of reality; in consequence, universal, potential and habitual the meanings are isolated as types of non-actual meaning.

As a result, the number of the theoretically possible oppositions of meanings increases. The opposition: actual *vs.* non-actual meaning implies three other oppositions of meanings: actual *vs.* universal, actual *vs.* potential and actual *vs.* habitual. The mutual relation of non-actual meanings can be written down in terms of the following oppositions of meanings: universal *vs.* potential, universal *vs.* habitual and potential *vs.* habitual.[12] Yet it is only rarely that those theoretically possible oppositions are revealed in grammatically correct Polish sentences. Only familiarity with the text or the situation, in which the ambiguous sentences function, makes it possible to understand those sentences without ambiguity.

In a sentence, an ambiguous verb usually occurs in the position of neutralization of the opposition of meanings.[13] For instance, in the sentence: *Wojtek pięknie maluje* [*Wojtek paints beautifully*] the verb *malować* [*to paint*] occurs in the position of neutralization of the opposition: actual *vs.* potential, actual *vs.* habitual, potential *vs.* habitual meaning. Neutralisation of the opposition of the same meanings pertains to the position of the verb *pływać* [*to swim*] in the sentence: *Jan pływa szybciej niż Wojtek* [*John swims faster than Wojtek*].

[12] In the current article the issue of mutual dependencies between the types of non-actual meaning has been limited to their opposition.

[13] Relatively, those oppositions, in which one of the elements is universal meaning, are the ones that are the most frequently revealed in sentences; cf. examples of universal meaning.

The rule established herein does not conflict with the existence of context modifiers of the meaning[14] of verbs. Those modifiers cancel the ambiguity of the verb in a given sentence. They most frequently function as indicators of the habitual meaning of the verb.

An important role in conveying habitual meaning is played by the adverbials of the measure of time, which have a general meaning of "how often", e.g. *często* [*often*], *zwykle* [*usually*], *rzadko* [*rarely*], *dwa razy dziennie* [*twice a day*], *co roku* [*every year*], *każdego wieczoru* [*every evening*]. Such verbs as *spać* [*to sleep*], *pływać* [*to swim*], *pić* [*to drink*], *odjeżdżać* [*to leave*] have only habitual meaning, for instance in the following sentences: *Jan często śpi po obiedzie* [*John often sleeps after lunch*], *Marek pływa dwa razy w tygodniu* [*Mark swims twice a week*], *Babcia pije herbatę co godzinę* [*Granny drinks tea every hour*], *Pociąg do Zakopanego odjeżdża codziennie z peronu drugiego* [*The train to Zakopane leaves from platform two every day*].

The adverbials of time pertaining to a point in time (e.g. *o siódmej rano* [*at seven o'clock*]) and to a stretch of time (e.g. *nocą* [*at night*]), which have a general meaning of "the period of time", limit the use of a verb to habitual meaning, e.g. *Andrzej wychodzi z biura o czwartej* [*Andrew leaves his office at four*], *Wojtek je śniadanie o świcie* [*Wojtek eats breakfast at dawn*], *Jan latem gra w piłkę nożną* [*John plays football in summer*], *Barbara w lipcu zbiera maliny* [*Barbara gathers raspberries in July*], *Marek pracuje w ciągu dnia, a uczy się nocą* [*Mark works during the day and studies at night*].

The object in the plural is often an indicator of the verb's habitual meaning, e.g. in the sentence: *Jan pali papierosy* [*John smokes cigarettes*] the verb *palić* [*to smoke*] has habitual meaning, which can be put in opposition to the same verb's actual meaning in the sentence: *Jan pali papierosa* [*John is smoking a cigarette*]. Thus, the object in the singular can be an indicator of the verb's actual meaning. These theses are corroborated by the opposition of actual *vs.* habitual meaning of such verbs as, for instance, *pisać* [*to write*] and *czytać* [*to read*] in the following pairs of sentences: *Jan pisze książkę — Jan pisze książki* [*John is writing a book — John writes books*]; *Jan czyta gazetę — Jan czyta gazety* [*John is reading a newspaper — John reads newspapers*].

The above test revealing the opposition of meanings is not infallible. The

[14] The term "modifier" is here used in its colloquial meaning (in accordance with the morphological structure of the word) rather than as a scientific term. In the circles of the investigators of the logical and semantic structure of the verb, "modifier" functions as a semantic-syntactic term. It usually denotes the element of the sentence not connoted syntactically by the verb (most frequently the adverbial).

opposition of actual *vs.* habitual meaning is neutralised in such sentences as, for instance, *Jan sprzedaje butelkę* [*John is selling a bottle*] and *Jan sprzedaje butelki* [*John sells/is selling bottles*]; *Basia bawi się lalką* [*Barby is playing with a doll*] and *Basia bawi się lalkami* [*Barby is playing/plays with dolls*].

A problem arises, therefore, with the veracity of scope of the proposed theses; for which verbs can be established by the following rule: the opposition of the number of the noun functioning as the object determines the opposition of the actual vs. habitual meaning of the verb functioning as the predicate. This problem can be solved only after a deep consideration of semantics.[15]

The point of departure for the reflections contained in this article was a thesis pertaining to the primary (actual meaning) and secondary (non-actual meaning) function of the present tense.

The problem with the relationship between the non-actual meaning of the verb and the category of tense and the temporal location of the conveyed facts requires some explanations. The present tense of the verb in the secondary function has a neutralised temporal meaning, because it does not convey the relation between the moment, in which the utterance is produced, and its content; therefore it does not fulfil the function typical to the units of the grammatical and semantic category of tense. Consequently, the present tense of a verb in non-actual meaning does not locate the conveyed facts in any time.

Constant facts or events expressed by the verb's universal meaning occur always, but they cannot be treated as absolutely timeless phenomena — timelessness is a relative category. All facts and events must have their beginning and end. For instance, the sentence: *Ziemia kręci się dookoła Słońca* [*The Earth revolves round the Sun*] does contain a great quantifier, but does not express an absolutely timeless event, but an event which has a certain time framework, since the Earth has not ALWAYS existed. The conveyed event is repeated always, but only since a definite moment: since the time the Earth is in existence.

Thus the so-called timeless facts are, contrary to appearances, located in time; but their time location is irrelevant from the point of view of the

[15] More than one object can be the subject of actions denoted by such verbs as *sprzedawać* [*to sell*], *bawić się* [*to play*] (it is possible to be selling more than one bottle, or playing with more than one doll, at the same time). On the other hand, actions denoted by verbs *pisać* [*to write*], *czytać* [*to read*] do not permit more than one object at a time (it is not possible to be writing even two books, or reading even two newspapers, concurrently). Two hypotheses arise: the number of the objects of action concurrently permitted by its doer either depends on the extra-linguistic reality, or is lodged in the deep semantic structure of the verb.

opposition of the units of the grammatical and semantic category of tense. Facts conveyed by the verb's habitual meaning are always located in time, although this location does not necessarily have context indicators. Most often, the function of time locators is fulfilled in an independent way by the adverbials of time, for instance: *Podczas wakacji Andrzej śpi do dwunastej w południe* [*During holidays Andrew sleeps until noon*] (= Andrew has the habit of sleeping until noon in during holidays); *Jesienią bracia zbierają grzyby* [*The brothers gather mushrooms in the autumn*] (= The brothers have the habit of gathering mushrooms in the autumn); *Po pracy Kowalski często gra w brydża* [*Kowalski often plays bridge after work*] (= Kowalski has the habit of often playing bridge after work).

The adverbials of time, however, are not the only indicators of habitual meaning. As a result, time location of the facts conveyed by this meaning of the verb does not necessarily have to be relevant from the point of view of the opposition of the units of the grammatical and semantic category of tense (cf. universal meaning). For instance, time location of the facts expressed in the sentences: *Jan pali papierosy* [*John smokes cigarettes*], *Jan pisze książki* [*John writes books*], *Kapitan Kowalski lata na śmigłowcach* [*Captain Kowalski flies helicopters*] is not defined by the context; however, those facts are not absolutely timeless either: John has been smoking since the time he began to smoke, John has been writing books since the time he began to do this, Captain Kowalski has been flying helicopters since the time he began to do this.

Time location of the facts conveyed by the verb's potential meaning occurs analogously to the location of facts conveyed by habitual meaning, e.g. *Dziecko już od tygodnia mówi kilka wyrazów* [*The child has been saying a few words for a week*] (= it is a week since the child has been able to say a few words); *Pisklę od dwóch dni już fruwa* [*The chick has been flying for two days*] (= the chick began to fly two days earlier). The mutual relationship between the category of time (functions of the present tense) and the separate meanings of the verb and events (facts) conveyed by those meanings are schematically presented in the table below.

The categories of actuality, potentiality, habitualness and universality function in the language as variable semantic categories of the verb. The position of neutralisation of the opposition of the verb's meanings, which is regular in Polish verbs, is determined by the ambiguity of the present tense. Causes of this ambiguity lie in the grammatical structure of the verb: the units of the grammatical and semantic category of tense are multi-functional, and hence the boundaries between the units of that category are blurred.

		meaning of the verb			
		ACTUAL	NON-ACTUAL		
			Potential	Habitual	Universal
grammatical tense of the verb	form	the present tense			
	meaning (function)	primary - the real present	secondary - the unreal past		
event	time of event	moment of utterance	irrelevant or defined by context		irrelevant
	type of event with regard to frequency	one-time event	possible event (single-time or recurrent)	recurrent event	constant or continuous event

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Wiesław Kotański

THE SEMIOTIC BASIS FOR INTERPRETING A RELIGIOUS SYMBOL (ON JAPANESE MATERIAL)

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Upon entering a Catholic church, just by the door to the narthex we notice a stoup with holy water. A worshiper dips the fingers of his right hand in the water and then with those fingers makes the sign of the cross upon his breast. At the entrance to a Shinto temple in Japan, we shall see a stone or concrete basin with pure water, usually placed on a dais and protected with a little roof. On the edge of the basin stand a few bamboo ladles in the shape of a small round box with a ca. 30 cm long handle. With that ladle, a worshiper takes some water from the basin and then rinses his mouth and washes his hands with it.

Let us now imagine a naïve Catholic, who upon entering a Shinto temple would dip his fingers into the water basin at the entrance and make a sign of the cross. Likewise, let us imagine a naïve Shintoist, who enters a church, takes some water from the stoup and washes his hands. It is quite certain that in Japan, the first scene would cause no protest at all; it would be slightly strange, but no more. In the second case, our naïve Shintoist could easily find himself in a lot of trouble. This is valid, of course, not only with regard to the use of water at the entrance to a temple; the same refers to any other form of behaviour which is sanctified by a customary ritual.

The question arises, by means of what mechanism is the water placed at the entrance to a holy place, devoted to this or that divinity, treated differently or at least to what purposes do they serve? By what token is it

necessary to take off one's hat at one shrine, while at another it is imperative to put it on? To what do this and other similar phenomena pertaining to religious subcultures attest?

We know that religious customs, even within a single country, encompass many diverse phenomena and forms of behaviour, and that these phenomena have their own histories, justifications and interconnections. Also, religious behaviour is so ubiquitous and so widely extended in geographical space that it is impossible for anyone, even a vast research team, to ever observe it in its entirety. Asking the native residents for information, we would never avoid doubting the degree of accuracy of their confidences regarding personal religious feelings and experiences, their associations, judgments, conclusions etc. After all, the attitudes and tendencies of the human psyche constitute an integral part of human behaviour and there is no way to overlook those internal factors, in spite of the danger of getting mired in subjective interpretations. All that we have in our defence here is our aspiration that everything individual has the right to be called inter-subjective. This, of course, is no guarantee of veracity or objectivity, since, for instance, collective psychoses are a very well known symptom in social pathology; however, beside this inadequate means of defence, there remains only cautiousness, which in extreme cases can be taken so far as to resign from anything that so much as suggests subjectivism, or even inter-subjectivism.

If, however, despite such difficulties we do not resign from our intention to answer the questions posed above and similar ones, we must find implements that would enable us to produce an interpretative description of, and more broadly to understand, religious phenomena, especially the customs and rituals pertaining to this area of culture. A scholar must aim at a defined order of his description — a well-grounded order, motivated with arguments comprehensible (and even better: acceptable) to the recipient of his description. Those arguments must be chosen in such a way that the recipient would accept them as his own and, in a future confrontation with similar facts, would be able to apply them with understanding.

But even this approach has its negative side. An order assumed *a priori* or an excessive rationalization, especially of such cultural processes as religious tradition, may to a certain extent deform the image of the real state of affairs. However, there is no cognition without a tendency to impose order; every observer imposes a modicum of order, even in a description which is far from scientific, by omitting one detail and adding another that completes a well-turned whole, or including *en passant* an incidental comment. Hence a scholar, aiming at a maximum objectivity of the obtained image of the

world, is obliged to tread cautiously; he must formulate generalizations and general frameworks, within which concrete examples and amplifications are to be placed, exclusively on the basis of broad, general knowledge of the issue. Also, the motivation behind the selection of premises and assertions cannot negate the generally accepted laws of methodology, logic, natural or humanistic sciences; in addition, it should not, as far as it is possible, infringe on the principles of so-called common sense.

Let us now delineate this most general framework for the understating of the tradition of a religious subculture. This is crucial insofar as, at least in the author's opinion, only through the lens of that framework is it possible to view the outline of the mechanism by which a religious system as a whole functions continuously, with enough clarity; whereas the observation of the universe of belief without such implementation hardly conveys a dynamic image, and additionally one fragmented into only loosely interconnected elements.

To give a concrete example, let us return once more to the stone basin with pure water in the courtyard of a Shinto temple. It resembles in appearance a deep trough for watering horses. Let us assume that a thirsty horse would come there and drink from the basin, or a tired pilgrim would moisten his forehead with water — this would constitute natural utilization of the qualities of the liquid contained therein. An entirely different set of factors arises when the same pilgrim or a worshiper visiting the temple, acting in accordance with the local custom, fills the ladle with water, takes it into his mouth for a ritual rinsing and spits it out, finally rinsing his hands with fresh water from the ladle. While the natural utilization of water could occur at any place and could be performed, as it has already been mentioned, also by an animal, in the second situation the location of the basin in the vicinity of a Shinto temple and the participation of a proficient actor (in the sense of the performer of the act, that is of the above-described actions), that is the Shintoist who enters the temple and knows how to behave in the circumstances, seem to be a *conditio sine qua non*. The manner in which water is used in this situation is called, in contrast to natural utilization, a cultural act, or even more: a cult act or a religious one. In this act, water is treated conventionally, because rinsing or washing resembles a natural act only partially, if at all (considering that it is to be performed even when a person is convinced of the cleanness of his hands and mouth). It is simply a gesture assumed by the ritual, and thus more of a symbolic movement, and in this the water plays the role of a prop. Such a prop resembles a word in a sentence, which can be replaced with different words of a similar meaning,

with no essential change in the sense of the complete sentence, since only that sense in its entirety is what matters in communication. Similarly, only the entirety of a gesture is essential in a cult act. It must be added that a prop in that gesture not necessarily has the character of a symbol; even in a sentence a word can sometimes be replaced with, for instance, a demonstration of a concrete object.

A comparison with a word in a sentence is not accidental, since the area of religious symbolic gestures is very closely connected with the area of speech gestures, which also are often described as symbolic. An interest in cult gestures does not exclude an interest in their elements, e.g. water or salt, parallel to the way an interest in the sentence always involves its elements — words or morphemes. In contrast, an interest in the elements of cult gestures only (and this is often the case in descriptions of no more than static objects and products of cult acts) can totally eviscerate the description or turn it into a pure catalogue, thus directing it away from the fundamental task, which is to interpret essential moments of the religious activity. Similarly in linguistics, an exclusive interest in the vocabulary is no more than cataloguing, it does not explain the process of speech. Since, however, we are dealing with symbolic gestures, in short — with symbols (the author considers all symbols to be exclusively products of appropriate gestures or creative acts), in such symbols, as in all symbols, their structure must be possible to demonstrate. This structure involves the symbol's elements and their interconnections, that is its syntax or syntactics; its pragmatics, that is connections between the symbol and those who use it; and finally its semantics, that is relations between the symbol and the reality to which it refers. These are the three segments of the general theory of signs, known as semiotics, first postulated by Charles Morris in his 1938 work *Foundations of the Theory of Signs* (probably under the influence of the semiotic concepts of Charles Peirce, 1839-1914). It must be stated in advance, however, that rigorous requirements addressed to semiotics by logicians (and not always fulfilled here) cannot, at least at the current stage of research, be applied in the attempt to systematise the methods of description pertaining to cult customs. It seems that in this case, Morris's postulates may only serve to corroborate that we are moving within the area of a related field, one of the many fields of semiotics, which so far has been developing most successfully with respect to linguistics and logic, although even then with, generally speaking, inconsistent results.

Thus, it can be assumed that:

a) the gesture of an ablution in front of a temple clearly has its own

syntax (which has already been described in detail), although we cannot be certain which elements of that gesture are worthy of attention, that is which of them are relevant because they play an essential role in the gesture (a similar situation may occur when we consider e.g. sentence structure);

b) this gesture has also its pragmatics; it is used in an appropriate manner by the performer of the gesture (the actor or agent), actuating its syntax and also, indirectly, imparting some semantics on it. In this case, we may speak of expressing oneself by a gesture; most probably a person observing the gesture being made would accept it or reject it as inappropriately made, would understand the performer or would be confused by his action etc. It may seem difficult that the performer of the gesture is, concurrently, an element of the gesture and its agent; yet his role in the gesture ought to be understood differently in each case (in syntactics, the agent is simply a syntagma; in pragmatics he is the executer of the gesture including that syntagma);

c) the question of what should be considered the semantics of a religious gesture, of what constitutes that reality to which it refers as a symbol, seems to be the key to understanding the mechanism of cult customs and therefore should be considered in more detail.

First of all, it needs to be stressed that it is not entirely obvious to what any given symbol refers to in the real world, apart from itself. It is true that many scholars assume that the so-called meaning is permanently connected with the symbol (for instance de Saussure compared the meaning — symbol relation to two sides of the same coin), and native speakers generally think that they comprehend the meaning of words and phrases the moment they reach their awareness; however, it is also known that the ambiguity of linguistic products is an inherent feature of every ethnic language and that it would be useless to demand from any native speaker that he invariably use words in the same meaning. A word used in a statement is no more than a suggestion that the contents lies within certain semantic boundaries — for instance, when saying *zamek*, the native speaker of Polish means neither the moon nor a hippopotamus; but the boundaries are rather broad here, including as they do fortresses, and door-locking mechanisms, and a part of a firearm, and a type of quoin linkage. Upon hearing a sentence: "Trzeba naprawić ten zamek" [This *zamek* needs mending], only the situation may point the listener in the right direction (the situational hint may, of course, be interpolated in the sentence itself).

Cult symbolism presents a much more difficult case. A large part of agents act s rather non-semantically here, simply imitating certain gestures

picked up from other people (in the same way a parrot imitates human speech) and not giving any attention to their sense, that is to their semantic aspect. Often, even questions about the meaning of the gesture remain unanswered. However, both the characteristic structure of the gesture and the fact that its tradition remains alive for many years or even generations, indirectly proves that to some extent that gesture represents something, that it has a meaning. This reveals the so-called index function: if a sign with a defined structure is being realised, the existence of some cause of its traditional message and form can be guessed. In search of a possible cause we attempt to find similar facts in the cultural past or in a close cultural environment. At this point the so-called iconic function of the sign comes to the fore (indices, icons and symbols are the three types of semantic relations in which a sign enters; this hypothesis was posed by Charles Peirce, who, however, treated each sing as belonging to only one of those three types, whereas here they are conceived as three aspects of any given sign, with the proviso that the first two are, in a sense, more primary). A gesture is similar to something, it resembles, depicts or imitates something, even though not always very faithfully. Although some cases of imitation have been called non-semantic, the moment their similarity, that is iconicity, is revealed they acquire a definite sense — at least in the interpreter's perception. It is always the interpreter of the function that imparts meaning: he may concurrently be the sender, provided he does not assume the non-semantic attitude.

For instance, a historic novel has an iconic function, when ~~it~~ to some extent it reflects the past; this is relatively clear. But does e.g. literary fiction have this function? It seems admissible that literary fiction reflects a state of affairs that is entirely fictitious, made up, and which the author wished to present to the recipient as a characteristic, strange or ideal state. How should a theatrical play be interpreted, then, whose iconic character seems quite obvious and practically *a priori*? Regardless of whether the content of the play is historical or fictitious, iconicity can always be found in the fact that a play on stage represents the contents of the text, whose connections with the reality are identical as in the case of any literary work. The actor assumes the identity of a protagonist, performs gestures supplied by the script, uses the props mentioned in the play's text. Performing a cult act resembles theatrical acting to a very great extent: a number of movements are performed in accordance with a pre-set ritual similar to a script; the agent, like the actor, is an element and concurrently a performer of a complicated sign. What is the content of the "play" enacted by a performer of a cult act? We accept the thesis, acknowledged by, among others, Mircea Eliade, that

practically in every case that "play" is a religious message, an elementary constituent of every religion, known as a myth, or a part of a myth which for some reason became isolated from the whole.

It has already been said that the connection between a cult act and a relevant myth is supposed to occur on the very frail basis of similarity (the iconic function), and hence it is usually difficult to correctly pinpoint that archetype of a cult act that a myth constitutes, and even when it is pinpointed, this disclosure is not always accepted with equal readiness. This is because similarities are of a different nature, and the minds of the observers have different points of focus, especially considering the diversity of methods of explaining myths. Leaving out the justifications for the choice of one of those methods, the author merely presents the proposal that, in his opinion, best suits the theses offered herein. According to this proposal, and returning once more to the act of ablution in front of the Shinto temple, a hypothesis may be posed that this act — that is every performance of this act — refers to the first, mythical ablution. This is in all probability the ablution in the sea, performed by the god named Izanagi as a cleansing rite after emerging from the Underworld back to earth. Thus, every person performing the act of ablution now, in the past or in the future, enacts it as in the role of Izanagi, water used for ablution represents the cleansing seawater, the world outside the temple is seen as the Underworld, full of terrible beings and "filth," and finally the temple is the earth — a sanctuary for Izangi, who may rest there after his troubles. It is, of course, possible to ask to what end Izanagi performs his ablution, just as in the theatre we may ask ourselves why the playwright introduced this or that scene. A possible answer is that such a myth was composed to put forward the best method of conduct after leaving such a "filthy" place as the Underworld, whereas to devoted Shintoists it was the god Izanagi himself that gave mankind an example of how to purify themselves from filth.

The myth, quoted here in a very abridged manner, in its full version provides an additional space for interpretation. Izanagi's ablutions resulted in the emergence of new deities, including the sun goddess, the moon god and the storm god. It is not impossible that every time the act of ablution is repeated in front of a temple, it is supposed to mystically confirm or renew the birth of the deities who, in a Shintoist worldview, have a capital impact on human existence. The author of this article has so far not encountered an interpretation that would be this far-reaching, and he sees no possibility of corroborating it properly. Leaving the issue to the experts in Religious Studies, let us only recall, for the sake of analogy, the interpretation of the

Christian mass as a constant symbolic re-enactment of the sacrifice of Jesus for the salvation of mankind.

Summing up what has been said above about the semantics of a religious gesture: we assume that the reality to which this gesture referred to as a symbol is primarily a myth, and secondarily this proposal or motivation of a human being's behaviour in the world which is offered by the contents of that myth. Since, as we have attempted to demonstrate, every religious act or gesture has the fundamental features of a sign, like any sign it can be intentionally used only against the background of the entire system, or rather sub-system, of signs similar to it (such system's level of organisation is always an open issue, e.g. a system of myths not necessarily forms a coherent whole, but it is a certain articulated complex). Let us imagine, for instance, the Shintoist gesture used in the environment of a different religion (this would constitute an infringement of the syntactic order), or a faulty performance of that gesture in a Shinto temple (an infringement of the pragmatic order), or finally linking the meaning of the gesture with some tradition alien to it (an infringement of the semantic order). However, from the principle of the systemic order it is wrong to draw a conclusion that the systems do not influence or penetrate one another. For instance, Japan is a typical example of a conspicuous religious syncretism, that is interpenetration of different, sometimes even contradictory religious concepts; yet this in no way bothers the Japanese themselves. Under the influence of widely divergent concepts, the Japanese developed a condition of syncretism, and hence a certain new system, an eclectic religious synthesis, sufficient familiarity with which is a condition for the proper understanding of the customs and rituals of the entire community.

Myths, legends and other messages both written and oral constitute an inseparable element of that system. The system as a whole, with all its internal connections, which can, perhaps, be reduced to semantic, pragmatic and syntactic relations, has so far not been characterised anywhere; neither has the Japanese system been described in this form. The excess of sources has so far permitted a presentation of the issue only fragmentarily, fractionally or generally. Many details of the system have not been studied; some are presented with no connections to larger structures. In this article, the author, putting forward general semiotic theses for an ordered research procedure, wished to declare his fundamental research approach, which in the future may permit to delineate methodological principles of a scholarly description of the most fundamental phenomena, which are crucial to the understanding of religious life and its influence on the attitudes of the society.

Stefan Żółkiewski

ON THE PRINCIPLES OF CLASSIFICATION OF CULTURAL TEXTS

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I. The history of contemporary Soviet semiotic research is not very long, just ten years old. The research refers, however, to a much older tradition — to the structural and typological studies of literary works and processes of the so called school of Russian formalism, which currently undergoes a renaissance around the world. Already in the twenties certain facts began to be analysed as semiotic objects. Bogatyriev wrote e.g. about the semiotics of folk costume.

The characteristic feature of the latest research is the expansion of the field of study far beyond the literary and linguistic-literary issues.

The Soviet semioticians still continue their investigations in the field of the theory of literature, but they also include in their research all other branches of fine and visual arts, as well as music and film. Moreover, their research concerns mythology, folklore, sign languages, such cultural systems as numbers or structured behavior like etiquette. But Soviet scholars, most notably Yuri Lotman, deal above all with the typology of cultures as bigger individual wholes. Lotman, the author of works on poetics and literary theory, has also written over a dozen dissertations on specific individual features which differentiate complex cultural wholes comprising heterogeneous products and various structured modes of human behavior. Recently, in 1970, he published in Tartu University Press a small book *Statii po tipologi kultury*. It contains, among other things, his views on the principles of typology of cultural texts. I would like to discuss them.

II. Lotman's agenda has been to pave the way for the semiotics of

culture by searching for relevant, methodologically correct answers to certain type of questions important for the researchers of culture. He has looked for a common language of description of heterogeneous phenomena that have so far been described in autonomous languages, which has made any comparison difficult or even impossible. Lotman has taken as his point of departure literary studies, believing that typological methods, which take a concrete form on the basis of the principles of semiotic analysis, allow us to conduct correct comparative studies of various literatures, of literature in comparison with other branches of art and with all inartistic forms of activity of the human spirit.

These methods are helpful for the researcher in overcoming the remoteness and, consequently, the otherness of cultures in time and space. They allow us to create a description in the same language of objects as heterogeneous as linguistic texts and the text of behavior, by means of analysis of their common sign structure. In response to the needs of many researchers today, the author strives to create possibly the most universal meta-language for the description of heterogeneous phenomena and processes of culture i.e. for the common features of its different domains.

The purpose is, among others, to overcome very common errors in description. Let us take the author's literary example. If a researcher of Demian Biedny's poetics takes a look at the poetics of Lermontov and Pushkin from the point of view of the specificity of the analysed poetics and isolates in their poetics what in the language of immanent description of Biedny's poetics exists in his poetry, and also in the rich poetics of the two great romantics, it turns out that the historical development of poetics in the nineteenth century led to Demian Biedny as the main bloom and the end destination of this developmental process. This is a cardinal error of perspective in description, which is imposed by a too poor meta-language. The point is not to confuse the meta-language of description with the language of the subject. However, comparative studies have always run this risk so far. One of these autonomous subject languages would then become a meta-language for comparative descriptions. This methodology of description has also made it impossible to formulate reasonable predictions about the future development of culture. In view of futurological interests, this methodology should then be replaced with proper research. Any description of cultural phenomena, and even more a comparative typological description of heterogeneous phenomena, must use auxiliary models of phenomena, their interdependence, their processes and mechanisms. So, they should not be models, as in our example, with previously delineated boundaries. The perspective of introducing variations

to the model should be open until all theoretical possibilities, which are being discovered in the study, are exhausted. The historical prospects of development of Pushkin's and Lermontov's poetics cannot be described by referring to the poetics of Demian Biedny, chosen arbitrarily as one's perspective of description, but to all contemporary, present-day variations of the model of romantic poetics. It would be a mistake, however, to believe that we only have to extend our perspective as much as to be able to describe some romantic poetics in the language of the romantic type of poetics and with the help of this meta-language speak about Pushkin, Lermontov, Biedny and others. No system described immanently will reveal its specific features. A meta-language should exceed the limits of various autonomies of cultural objects.

The universalization of meta-language, the comparative studies and a correct typological procedure require a certain understanding of culture.

III. Lotman tries to define the features of the phenomena of culture as a constant structure and believes that for this purpose it is possible to treat culture as a semiotic phenomenon. It is an auxiliary procedure to historical research.

Lotman suggests that culture should be conceived as a semiotic mechanism that generates and stores information.

He treats human need for information as particularly significant. He even performs a dichotomous division of the types of human needs by the criterion of accumulating reserves. He divides them into those needs that we generally fulfil without taking recourse to previously accumulated reserves, for example those that are fulfilled by inhalation of air. The second group consists of those that we fulfil by accumulating reserves and reaching out to them. These are the needs for acquiring non-energy information. That which is used to meet those latter needs does not go into the structure of the organism, but it retains its own structure.

Culture is a condition of human social existence. The basic category of cultural analysis is text, while, as Mauss said, exchange is the elementary cultural model. And exchange, according to Lévi-Strauss, is an act of communication. It is always an information exchange. Before the exchange, information is collected. Therefore, information precedes communication.

Mediation of signs is necessary for this exchange. This is why Lévi-Strauss paradoxically calls the exchange of women among men a specific type of communication. Marriage is a sign of entrance into the wife's family. So is it the case with the simplest exchange of goods. Five bananas of equal value can mean a bowl of millet or, say, two fish, depending on the context.

So Lotman defines culture as all information which is not inherited in the genetic code, the manner of its organization and storage. Culture, however, is not a collection of information, but a mechanism for manipulation of signs, a mechanism of cognition.

Soviet semioticians are linguists by education. So they bring to their studies a specific linguistic ideology. This is facilitated by common practice. We know that the techniques of semiotic analysis arose out of the techniques of linguistic analysis. The first object of semiotic analysis was human speech and its codes — natural languages. The main suggestions of how semiotic studies should be shaped come from linguists, most notably from de Saussure. A great pioneer of semiotics is the linguist Roman Jakobson, a co-founder along with Trubetzkoy and others of the classic structural linguistics. Lévi-Strauss was the first to create semiotic analyses of other things than just linguistic facts of culture by transferring these linguistic methods and describing the structure of family relationships, and then by studying myths and establishing codes for their deciphering. This generalization of linguistic methods has its advantages and disadvantages. In the recent past it used to be an undisputed practice. As a result of detailed semiotic research in the last decade, it has been more and more emphasized that various sign systems within a culture differ from the structure of natural languages as languages. We come to the conclusion that languages are rather specific semiotic objects, and not a universal model of a semiotic object as such.

This does not mean that we have to reject many terms which are derived from linguistics and fruitfully used in the course of semiotic analysis of different objects. To these terms belongs the concept of a system, such as when we speak about a natural language system. In this sense, culture is a sign system. Where there are rules and anti-rules, canons and anti-canons, standards and anti-standards — there we have to make do with culture. Culture according to Lotman has the structure of a language. And it seems to me that this statement goes too far, if we think of all grammatical and repertorial, paradigmatic and syntagmatic determinants of a natural language. For Lotman does not say which features of the linguistic structure he means. Does he mean only the fact that it is a system? Then one could agree with him. A broader understanding, though, would require qualifications and, I think, precisely, limitations.

The next basic term, after that of the system, which Lotman introduces this time from the achievements of Soviet semioticians, is the concept of a secondary modelling system. And this concept allows us also to make a basic distinction between the structure of culture and the structure of a

natural language. When Soviet semioticians speak about secondary modelling systems, they mean the systems of signs which add a superstructure on the basis of a natural language. They mean the systems which are super-added structures built upon the natural language adopted by a certain collective. A typical example of a secondary modelling system will be literature. Its system of specific signs that model the world in which man lives, is super-added to the sign system of the natural language. But this is not only about the attitude to the natural language which is typical of the art of word. Because another example of a secondary modelling system can also be found, in the interpretation of Lévi-Strauss, in the cuisine characteristic of a given culture. The system of dishes: either home-made or game dishes; for the master's table or for the servants', the so-called "human" table; sacred or every day dishes; cooked (feminine style) or roast dishes (hunter's style) etc., is in fact homologous to a certain social order, its stratification, its characteristic social division of labour, etc., etc. We decode the cuisine system and its signs by using a model of social relations. The cuisine system at the same time fixes the model of these social relations, the relations in which this cuisine exists or was once formed.

In the secondary modelling systems the relation between speech and language is different than in natural languages. For example, for a carrier of a myth i.e. of some modelling representations — the "speech" of the system will be the surrounding world, which is subject to explanation, whereas the "language" will be the cultural model which decodes it and which is inscribed not in the contents of the myth but in its structure, in the specific relations between its signs. And the "speech" is not a set of separate decoded signs, but the world, which is in its entirety a realization of a mythical model. The famous Lévi-Strauss's interpretations of South American myths provide here a rich illustrative material.

Lotman believes that culture in its internal organization produces a structural diagram of a language. As a communication system, it has also features of other semiotic systems. In culture we are dealing with many languages existing side by side (languages broadly understood, such as the language of painting), attributed to different semiotic systems which operate within a given culture.

Utterances which have been produced and retained in these languages are called cultural texts, or ordered sequences of signs. Not all texts belong to culture, some belong to anti-culture. Texts are secondary to utterances. Every day cultural activity includes translating texts into other semiotic systems, identifying various texts, moving the boundaries between different

texts; thus, let us say, translations of religious texts into texts on decent behavior or on behavior that violates, even deliberately, some religious taboos. This means to identify a text of behavioral customs and a text of specific mythic tradition. And this is the modern blurring of the boundaries between literary and political texts, which is done at the expense of opening a gap between the literary texts and the religious ones. A poor distinction between the two kinds of texts was characteristic of older cultures.

To this kind of every day cultural activity belongs the process of translation of a part of reality into this or another language of a culture, the transformation of the latter into a text, that is into information retained in a specific way, and then incorporation of this information into the collective memory. An example of a non-text can be a forest, and an example of a text — a garden. The transformation of a fragment of landscape into a sentimental or English garden, accomplished through efforts of purposeful work, is a process of retaining specific information. For the visitors of the park in Arcadia this information will be actualized. The sign system of a sentimental park, retained in specific parks-texts, brings this information into the collective cultural memory of the Poles.

Lotman says that the creation of history, along with its myths, as a specific mode of cognition, is a form of collective memory. That which allows us to preserve memory is retained in texts. By text Lotman means an act of expression in a given sign system. Text can be taken as a rudimentary concept, it refers to the system of signals produced and retained in a collective. Texts serve the needs of the collectives which create them. Thus, by the function of a text we understand the relation between the system, its realization and the sender and the receiver of the text.

The importance of the role which the Soviet semiotics, especially Lotman's semiotics, has played, has to be ascribed to the fact that these researchers have tried to analyse cultures which Lévi-Strauss calls "hot" i.e. which are subject to rapid historical changes. They do not limit themselves to "cold" cultures, in Lévi-Strauss's terminology, i.e. the relatively stable, traditional cultures, which many ethnographers have attempted to describe comprehensively as defined, well-established structures. For a description of "hot" cultures it is crucial to include all innovations. From this point of view, Lotman's arguments raise critical concerns. The author strongly emphasizes the essential regularity of every culture. If he is willing to see any innovations, it is rather in the reversing of the rules or canons. Nature is his element, culture is a world of order or anti-order. From his reflections there emerged a concept which has proved fecund in cultural studies, the

concept of authenticity as opposed to conventionality and conformity. On the other hand, his horizon does not encompass the problem of ossification, petrification, or the phenomenon of alienation when a man-made cultural creation begins to reign over its creator, when it undergoes reification. It is precisely when the established relations in significant cultural orders turn into things, that they become alienated from the world of human relations. The author never really says anything about the creative activity; he speaks about the memory, about the process of learning. He constantly has in mind the relations: life — text — memory.

Any analysis of semiotic sign systems takes into account three points of view: the semantic, i.e. the relation of signs to the analysed reality; the syntactic, i.e. internal relations of a sign system; the pragmatic, i.e. the relation of the sender and the receiver to the sign system and its realizations.

It should also be noted that Lotman's theses are based on a specific concept of semantics, and even more so of syntax, while the pragmatics is limited to a minimum.

Further on, we are going to talk in more detail about this disregard for pragmatic issues. For now I merely indicate the critical moments which should be marked.

IV. In the analysed book Lotman gives an interesting example of an outline of the semiotic typology of the Russian culture in its development from the 11^{th} to the 19^{th} century.

He understands types of cultures as separate languages. Real cultural texts require a complex system of codes for their decoding. But, according to the author, we can always extract one dominant code for a group of texts which come from a restricted time and space. Unfortunately, we do not find out quite clearly what are the distinguishing features of this dominant code. Lotman believes that communication systems are always also modelling systems. Culture, therefore, through all its semiotic systems, by creating a correct model of the world, is also modelling itself. When we analyse this model, we detect the dominant code of a culture. Because every text contains signals which not only let us know how many codes are necessary to read it, but also what is the hierarchy of these codes. Every researcher of the signals contained in *Zabawa* by Mrożek understands that the main code that decodes this actually difficult work is existential, the next one is epistemological, and only the third one, in terms of hierarchy, is parodic, relating *Zabawa* to *Wesele* by Wyspiański.

The main thesis of the typology of culture proposed by Lotman is the conviction that as a basis of the classification of cultural codes we can a priori

establish their relationship to sign, signs, and sign systems. As the author describes further this relationship in semantic and syntactic categories, and never in pragmatic ones, the strictly Lotmanian understanding of his own thesis seems wrong to me.

Moreover, the author supplements the thesis with a historiosophical statement that a succession of dominant cultural codes will simultaneously be a history of an ever deeper penetration of the structural rules governing sign systems into the collective cultural consciousness.

This semiotic eschatology seems to me both unnecessary and quite untrue, but more on that shall be said below.

Lotman distinguishes four possible patterns of culture, when:
1. the dominant cultural code is only a semantic organization;
2. the dominant cultural code is only a syntactic organization;
3. the dominant cultural code rejects either type of organization, i.e. rejects signs;
4. the dominant cultural code is a synthesis of both types of organization.

And the pragmatic aspect is not even mentioned here. But let us save the criticism for later. At first, let us see how Lotman builds his typology of the Russian culture by operating these four theoretical schemes. The shortcomings of this procedure will clearly appear in its presentation.

Within the eight hundred years of the history of the Russian culture analysed by Lotman, he distinguishes a succession of four types of cultures: semantic (symbolic) in the Middle Ages; syntactic in the era of Peter I, the era of absolutism; asemantic and asyntactic in the age of Enlightenment; and semantic-syntactic during the development of the nineteenth-century bourgeois culture.

Lotman's sketch is quite cursory and this summary will be even more so, emphasizing arbitrarily selected main points of the characteristics. So all vulgarity of the latter should be attributed to the ineptitude of the referent.

According to Lotman the culture of the Middle Ages is characterized by semantization (and even symbolization) of the whole human environment. The main opposition which serves the modelling of the world in this culture is the opposition: that which has meaning versus that which has no meaning. To exist is to have meaning. Metaphorically speaking this culture is characterized by contempt of things and striving for signs. In describing his four types, Lotman takes as the basic distinguishing feature of the characteristic how the given type of culture conceives the part to whole relation. For the semantic type, a part is homomorphic in relation to the whole. A part represents the whole. This is for example the relation between a person and a medieval

corporation. Every part, as every shard of a broken mirror, reflects the determined whole. The principle of sign selection in this type of culture is not syntagmatic but hierarchical. They have a lower and higher status. The top sign has a zero expression, it has no tangible meaning. For example glory was valued higher than fame. We know this opposition from the novel by Iwaszkiewicz. Fame could be expressed through material objects: a gift of princely grace, a reward for one's merits. Glory, valued higher, was the privilege of those who fell in battle on the field of glory. Nothing material expressed it, the dead hero did not receive anything. Glory was articulated by a sign of zero expression. Secondly, a characteristic feature of cultural signs of a semantic type was their iconicity. For example, man was created in the image and likeness of God. Thirdly, the meaning of a sign had a hierarchical structure, it could be explored. It was possible to discover deeper meanings of a symbol. And finally, the fourth feature of this type of culture was that its model of the world was achronic. The syntactic relations were not helpful either in determining the above described part to the whole relation (and therefore also the relation of an element to the whole sign system), or in establishing the hierarchy of signs, or in their iconic shaping, or in an in-depth interpretation of the meaning which *eo ipso* did not depend on syntactic relationships of the interpreted sign. Finally, another feature characteristic of syntactic relations which was absent in this type of culture, was the expectation to follow the arrangement in time of individual syntactic elements. All the main problems listed here were resolved from the semantic aspect, the aspect of the relation of a sign to the denoted reality. Thus, there appeared a specific system of symbolic signs which were not related syntactically, but remained in a hierarchical relationship between them, in an iconic relationship to the denoted reality; a system which was characterized by the increasing meaning of each sign, which could be explored; a system in which the arrangement in time was not a frame of reference.

And as for the syntactic type of culture Lotman describes the culture of the enlightened absolutism. It rejects any symbolic meaning of phenomena and events. Its dominant significant cultural behavior is characterized by pragmatism and empiricism as well as the desire to simplify the culture. In this culture, to exist means to be a part of. A part is not tantamount to the whole, it does not represent it. A part is an element of the system, of the whole. The main problem is the place in the system, the place of the part in the whole and the resulting relations to other components and systems. Time and its arrangement are an important frame of reference here. An arrangement, a regular system have their beginning in time. The past is

chaotic, disorderly, irregular. And we strive for a more perfect order in the future. The development of the system, its improvement, the increase of regularity occurring in time. The development goes from the old to the new, from chaos to regularity. The appropriate relationships for these regularities are syntactic.

As an asemantic and asyntactic type of culture Lotman describes the broadly understood culture of the Enlightenment. When the author spoke about the semantic and syntactic types, he at least analyzed chosen systems of cultural behaviors. When characterizing his third type, he writes almost only about the sphere of ideology of the Enlightenment, about the sphere of articulated consciousness; he does not discuss any systems of actual behavior, only their ideological programs. It is too poor a characterization. This is due to the fact that the Enlightenment is characterized by a worship of things and a rejection of all signs. The main opposition of this culture, the opposition of the natural to the conventional, the civilized, determined the falsity and uselessness of all signs. In this culture, there existed elements which were detached, not related to the whole either as a part of the system placed within it in its own, defined location, or as a part which reflects the whole. It is no coincidence that the lonely Robinson came to be the typical model of the Enlightenment. This order of freedom of separate entities, however, did not exist in the reality of the Enlightenment, but only in the ideology of that time. Therefore, the "non-signs" of the Enlightenment, separate, independent and therefore free things, were just signs of, so to say, a higher degree: signs of that which, as a true reality of free individuals, was excluded from the real world. Lotman, however, says nothing more about the system of these signs of a higher degree.

Finally, as for the semantic and syntactic Lotman describes the culture of the nineteenth century. All events in this culture are subject to a twofold interpretation: semantic and syntactic. The semantic one refers the physical aspects of life to their meaning; and the syntactic refers them to the historical whole. Meaningful facts are important, but only within the system. The model of the world in this culture has the structure of language. Facts outside the system are not significant. This culture is characterized by conformity, for a part makes sense only within the whole, when it submits to the regularity of the system.

Lotman ends his characterizations with a consistent but quite eschatological thesis that in this way "[...] the range of possibilities to change the codes of culture were exhausted and any departure from one of those systems led to the renewal of another one." He even speaks about "a new

cycle of development of the types of culture."

V. The characterizations of culture types, invented by Lotman and only too sketchily recapitulated by me, even in this presentation are not deprived of correct observations and accurately selected relevant features. Some of them are recognized by the researchers of culture as the traits of the cultures of those epochs which Lotman examined; these features have already been known, except that they are expressed in the language of semiotic interpretation.

Despite these undeniable advantages, I think that Lotman's attempt must be considered a failure.

It is in many respects a successful and methodologically pioneering attempt to describe simultaneously a number of different semiotic systems, highlighting their common rules. It is then an attempt to detect the same sign system settled in various, often very heterogeneous semiotic materials. But this is not a typology of culture. It is not, I think, even an attempt to pave the right way to establish such a typology. Although, as we indicated, it is not clear what Lotman means by the dominant code, it appears that among semiotic systems of a culture there cannot be any important ones which we could not decode by using the code which Lotman called dominant.

Now, Lotman's characterizations do not meet this condition. Accidentally, there is a different, but also semiotic analysis of a certain part of the culture of the Middle Ages; and not of one semiotic system which would be proper to it, but an analysis of a certain whole, within which many different semiotic systems functioned. I mean the folk culture of laughter, the culture of carnival described by Bakhtin in his work *Tvorchestvo Fransua Rable* (1965). The culture described in this work was, in the medieval era, a whole which had many functions and which stood, as folk culture, in opposition to the official ecclesiastical and chivalric culture. So this is not a phenomenon that could be disregarded in the entire culture of the Middle Ages, both folk and chivalric. The dominant code of the folk culture of laughter, the culture of carnival, is, according to Bakhtin's analysis, definitely syntactic.

Bakhtin analysed the texts of carnival behavior, detecting its particular system of signs, preserved for example in the texts of carnival literature, most notably the masterpiece of Rabelais. The cheerful carnival folk rebellion, socially acceptable in a particular place, in the town's market place, in a particular season, in the system of its signifying behaviors, modelled "the world turned upside down" — upside down in relation to the model of the world of the official ecclesiastical and chivalric culture. Depending on the place of carnival behavior in the system, and thus depending on the syntactic

relations, for example death became a cheerful bogeyman, a demise was always ambivalent, as it had to remain in an intimate relation with birth. The model of the world turned upside down was built by reversing the syntax rules, but precisely just the syntax rules, which govern the parts of the official system. There is no hierarchy of signs here with zero expression signs ranked as the highest. On the contrary, the syntax of the carnival behaviors ascribes particularly rich meanings to the most vulgar, material expressions, to those Rabelaisian wide open, devouring and drinking throats, to the rumps stuck in the air and casting fecal matter, to all that which is a carnal pit, an abyss, a descent into hell.

The folk culture of laughter is not only an anti-culture in relation to the official culture of the church and knighthood. For carnival behaviors created a regular system. Carnival beatings, sometimes cruel, had a different meaning than a punishable and prohibited brawl in the official culture, only because they occurred in the syntactic relations with other elements of the carnival behavior system. The carnival behaviors were materially identical to the physically similar behaviors in the official culture. But in the official culture debauchery, beating and gluttony were sins. And when the same behaviors were placed in the syntactic relations of the carnival system, when they formed an independent complex, they took on a different meaning. They became allowed, but only in this system, within its time-spatial cultural boundaries, in the syntactic relation with a whole series of regular, preceding and subsequent carnival behaviors. The carnival was a game and, like all games, it was governed by certain rules, it created a regular, predictable and repeatable order of behaviors. There are no interpretations of games and carnivals outside of the syntactic code. And even if the carnival was not identical with all the folk culture of laughter of the Middle Ages, I think it was its essential component.

It is impossible, therefore, to say that the dominant code of the culture of the Middle Ages was the semantic code. The syntactic code seems to have played an equally important role.

I see the essential reason of Lotman's failure in his total disregard of the pragmatic aspect. Lotman takes into account only the syntactic and semantic aspects. He limits himself to an internal, immanent analysis of texts, to the semantic and syntactic analysis, he is not interested in the relations of the sender and the recipient to the text i.e. in the pragmatic issues of text and communication. Meanwhile, it seems that the texts of the official culture of the Middle Ages, which were there to satisfy the need to retain the model of the world functioning in that culture, are indeed shaped

in accordance with the semantic code. And this is the subject of Lotman's observations, which have been confirmed by other researchers of the chivalric culture (e.g. Huizinga), who noticed its dominant tendencies to symbolize. While texts — like the carnival ones, which served to satisfy the needs of rebellion and negation of the official world model — were shaped according to the syntactic code.

So the perspective of pragmatics allows us to encompass a wider horizon of differences between semiotic systems of a given culture. Unfortunately, this view contravenes the basis of Lotman's typology. In the medieval culture the semantic and syntactic codes seem to function simultaneously, though each one in conjunction with different pragmatic functions.

This is also true of other types of culture distinguished by Lotman. The culture of Absolutism, which in our country is taken more broadly as the culture of Counter-Reformation and Baroque, is supposed to have been characterized by the dominance of the syntactic code. But it is difficult to agree with this statement, bearing in mind the role of symbols in the Baroque culture. These things are only too well known to dwell on them longer. The same can be said of the asemantic and asyntactic nature of the culture of the Enlightenment. As Lotman analysed only the sphere of ideology of the Enlightenment, let us remain in this area. It was precisely in the ideology of the Enlightenment that all manner of utopias played a particularly important role — the utopias which were regular (syntactic) models of a better world and the utopias that symbolized a new status of perfect humanity. The importance of utopias in the ideology of the Enlightenment, in the ideology of Rousseau's era, does not allow us to treat them as insignificant elements of the ideology of that culture. On the contrary, it was one of the central components of this ideology. Whereas when Lotman writes about the culture of the past century and ascribes to it the syntactic-semantic code as the dominant one, he formulates theses which are, in principle, acceptable. But this is so because in our culture the syntactic and semantic codes have always functioned side by side and in a synthetic cooperation. It seems that such a conclusion can also be drawn from my critical remarks on Lotman's typology of cultures. Of course, I formulate this conclusion as a working hypothesis, which has yet to be verified.

It seems to me that an ambitious attempt to create a typology of cultures should begin with the pragmatic differences, with the establishing of the dominant relations between the texts of a given culture and their receivers and senders; more precisely, it should first consider all the results of the analysis of the pragmatic aspect as the basic one and of the syntactic and

semantic aspects as auxiliary ones.

Lotman, however, consciously claims that semantic and syntactic features are the basis for a typology of cultures. He suggests two perceptions of culture — either as a collection of texts, or as a set of functions. When we approach culture as a set of functions, we treat texts as historical phenomena which derive from a function or functions. By function, let us recall, we understand a mutual relationship between the system, its application and the sender and the receiver of the text. The first approach requires an analysis on two levels — that of the texts, and, separately, that of the functions. It requires, therefore, an introduction to a separate aspect of pragmatic issues. Lotman chooses the second approach. This allows us to examine the text and functions on one level. Lotman literally rejects the thesis that "the nature of a text is determined by pragmatics, and not by its semantics and syntax." And he believes that "a change of the function of a text creates a new semantics and syntax of that text." Semantic and syntactic research is therefore sufficient, research of the text only, and not of the recipient's and the sender's relation to it. For the latter relation will be thoroughly but indirectly explained by the trend of the renewal of the semantics and syntax of a text, which are a reflection of a specific change of its function, i.e. of the pragmatic relations. Now I think that it is in this agenda that Lotman's pioneering research is erroneous. One should choose the first possibility of approaching culture as a set of texts rather than functions. One should separately, on a different level than that of the texts, study their functions.

I must limit myself to critical remarks. I have discussed elsewhere some positive typological attempts, when I was considering the most recent culture as a whole. Here I would like only to formulate and briefly justify the principles of research which I suggest to adopt. Cultural wholes consist of different semiotic systems and their established texts. These differentiations are relatively stable. In the cultural studies we distinguish political, religious, artistic, and many other systems, as well as subsystems, e.g. in the semiotic system of art there are semiotic subsystems of literature, music, visual arts. These systems do not function in a given culture side by side; they form complex and distinctive structures. Depending on the place of the system within the structure of the whole culture, the realization of the system, i.e. an appropriate text, has a different function. For example, the texts of medieval literature were, within the structure of medieval culture, linked differently with the religious semiotic system of that culture; thus their place in the structure of the whole culture was different, their function was different from that of literary texts in the politicized culture of the twentieth century.

Literature, which in the whole culture is more closely connected with politics than with religion, has other functions; the attitude of the receivers and the senders to its texts is different. It is necessary to start by determining this relationship with its specific historical and social transformations. The question we try to answer is what needs are satisfied by particular texts and what social forces those texts serve at a given historical moment? How are the new functions of those texts related to the change of the place of the semiotic system, of which they are a realization, within the structure of the whole culture? Finally, how this change of function is related to the semantic and syntactic characteristics of those texts? I think it is within the range of these issues that we can find the starting point for a search of a typology cultures.

The nature of discrepancies between Lotman's theses and my critical remarks proves that we are at the threshold of the development of semiotic research. So there can be large differences between consecutive theses of two authors, with their consent as to their constitutive theses. The pioneering role of Lotman's work is very significant. His semiotic interpretation of culture, based on the information theory and an analysis of the processes of social communication, seems very fertile. Let me repeat, it allows for its description in one language heterogeneous cultural phenomena; it enables us to conduct comparative studies and research on cultures as wholes. His most recent studies on culture are the first attempts to synthesize the analyses of many different semiotic systems, the results of which are comparable, because the analyses were made in one language of the sign theory. We have valuable semiotic analyses of literature, film, fashion, manners, etiquette, myths, number systems, traffic signal systems, natural and artificial languages. Today a synthesis of these results is needed.

Lotman paves the way for these synthetic proceedings with the courage of a pioneer, the talent of a researcher and the imagination of a theorist.

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