Barbara Stanosz

ON THE NOTION OF A PRELOGICAL LANGUAGE

Originally published as ”O pojęciu języka prelogicznego,” Studia Semiotyczne 1 (1970), 143–149. Translated by Witold Hensel.

It is a platitude that essential differences exist between problems taken up within the logical theory of language and those taken up within linguistics. It is also commonplace that even when a problem receives the same formulation in both disciplines the logician sometimes approaches it using different research methods than the linguist, and two research methods often yield divergent solutions. These facts do not usually result from lack of interdisciplinary contacts (though surely such contacts are worth cultivating), but from genuine dissimilarities between the theoretical issues that figure under the same heading in both sciences. The question about the notion of the meaning of linguistic expressions (or the necessary and sufficient conditions of synonymy), which has a different meaning for the logician than for the linguist, is a case in point: while the logician is interested in so-called cognitive synonymy, the linguist concerns herself with a more restricted notion of synonymy, which, besides guaranteeing sameness of cognitive content, implies sameness of expressive value and preserves other parameters that should be retained in literary translation. In this example, the two identically formulated problems differ from each other because the term ”meaning” (or ”synonymy”) has two distinct interpretations. However, usually the reason for such discrepancies is that each of the two disciplines relies on its own notion of language. In this respect, the logician is rather like a chemist who solves a problem in laboratory conditions, whereas the linguist is more like an applied chemist employed at a large factory who faces a similar problem, but on a quite different scale and under specific conditions. The applied chemist must adjust the laboratory results to her own problem, factoring in the degree of chemical purity of the substances involved, the accuracy of the measuring instruments, etc.; in an extreme case, the laboratory results may prove to be of no help whatsoever in solving the industrial problem. The practical value to linguistic research of the solutions and constructions offered by the logical theory of language is much the same. While logical analyses focus on artificial languages (especially on unnaturally simple model languages constructed so as to meet specific research desiderata), linguistic analyses concentrate on incomparably richer ethnic languages, which emerged spontaneously and are constantly in a state of flux. In logic, any system is classified as a language so long as it comprises: 1) a fixed inventory of expressions (defined by way of enumerating basic expressions and specifying the rules of construction for complex expressions), and 2) a complete set of rules of interpretation, which assign particular meanings to linguistic expressions. Although the structure of objects studied by the linguist is similar, their elements are fluid and indeterminate, defying exact specification. Consequently, many results yielded by the logical analysis of language[1] can be applied to languages studied in linguistics only "in approximation" and after suitable modifications; and there are likely logical constructions that cannot usefully be employed in linguistic research at all.

Thus, the linguist is fully justified in distrusting the logician's solutions to problems falling under the purview of both disciplines. The linguist should investigate the assumptions of such solutions and, having discovered that the assumptions are not satisfied by the natural languages she intends to study, she should either modify the solutions accordingly or decide not to use them at all.

Sometimes, however, a linguist's misgivings about the semiotic results obtained in logic and her attempts to modify or restrict those results for the purposes of analyzing natural language rest on a misunderstanding. The question of whether or not the laws of formal logic hold in a particular natural language is a typical example of this.

The logician assumes that any language she studies contains expressions known as logical constants, which are investigated by formal logic. The logical constants that are usually mentioned in this connection include the

[1] In any case, this is true of the work of so-called reconstructionists, most notably Carnap, who continues the tradition of logical positivism in this respect. Alongside reconstructionism, a different approach to language is being developed by Ryle, Strawson and others, which, at least programmatically, is closer in its aims to linguistics — it is known as the philosophy of ordinary language.

truth-functional operators of negation, conjunction, disjunction, implication and biconditional (designated by the symbols $\sim$, $\wedge$, $\vee$, $\rightarrow$ and $\equiv$, respectively), the quantifiers $\forall$x and $\exists$x, and sometimes a few other expressions. Logical constants have determinate meanings, posited by the axioms of logic and elaborated by logical theorems. For instance, the following theorem of propositional logic:

(1) $p \vee \sim p$

characterizes the constants $\vee$ and $\sim$ as the kind of expressions that produce a true statement when they are conjoined with two tokens of any statement in the same way as they are combined with the letters p in (1). In logic, a statement obtained from a logical theorem by consistently replacing every variable symbol with any linguistic expression, as long as it is of the same of syntactic category, is called a logical truth of that language; philosophers classify such statements as necessary, analytic or a priori truths. An essential property of such sentences is that, since they are true by virtue of the meaning of their component expressions (namely, the logical constants), one cannot dissent from them without violating the rules of the language to which they belong.

When the object of analysis is a particular natural language the problem arises of identifying the logical constants of that language or, in other words, of finding the linguistic equivalents of the symbols $\sim$, $\wedge$, $\vee$, $\rightarrow$, $\equiv$, $\forall$x and $\exists$x. The challenge is to discover which expressions of the language under investigation satisfy the axioms of logic when they occur in the same places as their corresponding symbols. For example, the claim that the logical constants of the English language include, correspondingly, the expressions: it is not the case that, and, or, if . . . then, if and only if, for any x and there is an x such that, is equivalent to the claim that the semantic rules of the English language force one to assent to any statement that has been obtained from any logical theorem by way of a consistent replacement of its (free) variables by any English expression, the symbol $\sim$ by the expression it is not the case that, the symbol $\wedge$ by and, etc.; in other words, a denial of a sentence such as

John is a hypochondriac or it is not the case that John is a hypochondriac

should be treated as a violation of the meanings associated in English with the expressions it is not the case that and or. In other words, someone who utters a denial of this sentence must be assigning a non-standard meaning to at least one of the expressions and so, in a way, "is not speaking

English."[2]

So how can one understand the claim that, in a given language — let us designate it by L — all the laws of logic hold? It seems that, on its simplest interpretation, the claim would boil down to the assertion that L contains expressions that are accurate translations (in the sense specified above) of all logical constants. Correspondingly, the claim that some law of logic — say, the law of excluded middle, given in (1) above — does not hold in L would amount to saying that L does not contain an expression that is an accurate translation of some (at least one) logical constant — in the case under discussion, of the constants $\vee$ or $\sim$. Naturally, the fact that law (1) does not hold in L would immediately entail that no law containing both $\vee$ and $\sim$ can hold in L, and also that the laws that do not hold in L include either all the laws containing $\vee$ or all the laws containing $\sim$. That there are natural languages that lack expressions corresponding to particular logical constants has been confirmed by empirical research.[3] Therefore, we can compare various languages with respect to how well they conform, in this sense, with logic; and we can use the term prelogical languages to denote languages with an extremely limited repertoire of expressions corresponding to the logical constants.

However, for a variety reasons, the term itself is rather unfortunate and, in any case, a taxonomy of natural languages determined only by the number of logical constants they contain does not seem to hold much methodological interest.

The term prelogical language carries with it certain presuppositions that rest on the aforementioned misunderstanding regarding the question of whether or not all a given law of logic holds in a given natural language. For instance, some works in linguistics (and ethnography) (see e.g. Malinowski 1935; cf. Quine 1960: 58f) contain a claim to the effect that, in some languages, some laws of logic, which feature only logical constants that have their equivalents in a given language, do not obtain (one law that is often cited in connection with this is the law of contradiction). The claim in question is usually formulated in the context of a description of the culture of some

[2]When it comes to natural languages, answering these kinds of questions is no easy matter because the semantic rules of natural languages have not been codified. In order to arrive at an answer, one needs to reconstruct them on the basis of sufficiently many observed acts of language use. In the case of dead languages, the problems are additionally amplified because one cannot induce the appropriate linguistic behaviors to observe.

[3]For example, ancient Chinese does not have a word equivalent to the logical operator of disjunction (Chmielewski 1963: 104-105).

primitive tribe and serves as a basis for characterizing the tribe's language and the mentality of the tribe's members as "prelogical." And this property of prelogicality is in turn taken to be the reflection (or the source) of an alleged inability of members of the tribe to engage in theoretical thought. Other works defend some natural languages against the charge of prelogicality and attempt to show that the basic laws of logic do hold in those languages; to this end, they often employ sophisticated conceptual distinctions (e.g., between the laws of logic holding "directly" and "indirectly") and cite a wealth of examples (Chmielewski 1963, 1967). It is easy to see that both sides of such disputes have fallen victim to a misunderstanding: the notion of a prelogical language, in the sense just specified, is internally inconsistent, therefore we know a priori that prelogical languages do not exist.

Consider a toy example. Let us imagine a situation in which researcher R is confronted with community C whose members speak language L such that R is unfamiliar with L. R will learn about L by observing the linguistic behaviors of members of C and pairing the linguistic expressions of L with the linguistic expressions of R's native tongue, L′ (which we assume to contain a full repertoire of logical expressions). Now suppose that, based on available observations, R forms the hypothesis H to the effect that two expressions of L — let us represent them as E1 and E2 — are equivalent to negation and conjunction in L′, respectively. Suppose further that, having accepted H, R is fully justified in translating expression E3 of L into a sentence of her own language L′ such that the sentence is a substitution instance of the law of contradiction:

(2) $\sim(p \land \sim p)$.

If H is correct then E3 is a logical truth of language L, which means that E3 is a statement that is accepted by every speaker of L. So if someone rejects E3 (either by asserting ∼E3 or by refusing to accept either E3 or ∼E3) then at least one of the following is the case: either H is false or the person in question — whether or not she is a member of C — is not speaking L at the moment. In order to ascertain which of these possibilities obtains, R has to appeal to further observations. It seems that R should establish whether members of C reject E3 (as well as other sentences of L that, assuming H, have the logical form of (2)) frequently or only in "special circumstances." Moreover, R should also find out whether or not a rejection of E3, when it occurs in conversation, inhibits communication (e.g., causes the hearer to exhibit signs of surprise or confusion). If it turns out that, in the process of communication, members of C almost never reject sentences that, assuming H, have the logical form of (2), and it also turns out that, when such a rejection does occur, it inhibits communication, then R will be justified in retaining H or even claiming that H has gained additional empirical support. Otherwise, R has to drop H. But R cannot maintain, on pain of inconsistence, both that E1 and E2 are equivalent to negation and conjunction, respectively, and that one can reject any sentence of L in which E1 and E2 have the same syntactic function as the symbols $\sim$ and $\wedge$ in (2) without, at the same time, violating the rules of language L (or ceasing to speak L). The character and refinement of the culture of C and considerations such as the fact that many beliefs accepted by members of C may strike us as flagrantly irrational are completely beside the point.

The claim that particular laws of logic do not apply within this or that language is not always conjoined with the disparaging contention that the language in question should be classified as prelogical (although it usually is accompanied by some disapproving opinion or other). For example, it is not an uncommon view that the law of double negation, namely:

(3) $\sim\sim p \equiv p$,

does not hold in some ethnic languages (including Polish). In the case of the Polish language, this assertion is illustrated with sentences such as these:

(A) Nikt nie przeczytał wszystkich książek [Nobody not read all the books*]

(B) Nigdzie nie występują złoża uranu [Uranium not occurs nowhere *]

(C) Nigdy nie istniał ustrój prawdziwie demokratyczny. [A truly democratic system never did not exist*]

It is suggested that each pair of expressions: nikt — nie, nigdzie — nie and nigdy — nie, serves as a string of two negations which, however, do not "cancel each other out" because the statements above are not synonymous with the corresponding statements below:

(A′) Ktoś przeczytał wszystkie książki [Someone read all the books]

(B′) Gdzieś występują złoża uranu [Uranium occurs somewhere]

(C′) Kiedyś istniał ustrój prawdziwie demokratyczny. [At some point a truly democratic system did exist]

In fact, they are synonymous with the denials of their corresponding statements.

Considerations similar to those we have discussed earlier speak for a different construal of these sorts of cases. The fact that statements (A), (B) and (C) are not synonymous with (A′), (B′) and (C′), respectively, does not support the claim that the law of double negation does not hold in Polish;

on the contrary, it shows that the former are not double negations of the latter. The Polish words nie [not], nikt [nobody], nigdzie [nowhere] and nigdy [never] are not equivalent to negation. And they have a different syntactic function to perform in Polish sentences than does the symbol $\sim$ in logical formulas. The correct translation of this symbol into Polish is the expression nieprawda, że [it isn't true, that] — which is clear because, among other things, any Polish statement preceded by two consecutive occurrences of the expression nieprawda, że is synonymous with the original statement.

On the other hand, the fact that (A), (B) and (C) are synonymous with, respectively:

(A″) Nieprawda, że ktoś przeczytał wszystkie książki [It isn't true, that someone read all the books]

(B″) Nieprawda, że gdzieś występują złoża uranu [It isn't true, that uranium occurs somewhere]

(C″) Nieprawda, że kiedyś istniał ustrój prawdziwie demokratyczny [It isn't true, that at some point a truly democratic system did exist]

shows that there is a connection between the Polish words nie, nikt, nigdzie and nigdy and the logical operator of negation. This connection can be articulated by pointing to the fact that the phrases nikt nie, nigdzie nie, nigdy nie are interchangeable with phrases featuring the Polish equivalent of negation, namely: nieprawda, że ktoś [it isn't true, that someone], nieprawda, że gdzieś [it isn't true, that somewhere], nieprawda, że kiedyś [it isn't true, that sometime]. This is not a complete characterization of the connection in question; for example, in certain special situations the word nie can perform the semantic function of nieprawda, że alone (but then it has a different syntactic function than in the examples above). However, in Polish neither nie nor nikt, nigdzie or nigdy are equivalent to negation. Thus, their concatenation need not mimic the superposition of negation.

Let me repeat the acceptable interpretation I proposed earlier of the claim that a given law of logic does not hold in a given language. According to this interpretation, the claim asserts that the language in question does not contain an expression equivalent to at least one logical constant occurring in that law. I have also contended that comparing languages in terms of the number or kind of logical constants they contain is not a theoretically fruitful enterprise. This is because some logical constants can be defined in terms of others and thereby eliminated. In particular, as is well known, the equivalents of all logical operators in the propositional calculus are reducible to a single constant (and the same, mutatis mutandis, goes for quantifiers). Therefore, a language containing only Sheffer's stroke and the universal quantifier will be no logically poorer than a language featuring all logical constants of the propositional calculus and both quantifiers (though it will suffer from some pragmatic shortcomings such as verbosity). However, it is logically possible to have a language in which one cannot obtain certain logical constants by means of definitions (e.g., a language where the only logical constants are conjunction and disjunction, or a language without quantifiers). Such a language would be essentially logically poorer and its capacity to express claims and scientific theories would be severely limited. Research into the repertoire of logical constants in languages of primitive tribes, as well as into the gradual expansion of such repertoires in the languages of civilized nations may establish some correlations between the logical richness of a language and the relative development of theoretical thinking in the community of its speakers. It would also be interesting to see if there is any dependence between the process of expanding the inventory of logical constants by adding to it redundant items and the advancement of science. Such research might shed light on the optimum redundancy of logical components of language.

Bibliography

1. Chmielewski, Janusz (1963) ”Notes on Early Chinese Logic.” Rocznik Orientalistyczny 26[2]: 91-105.

2. Chmielewski, Janusz (1967) ”Linguistic Structure of Two-Valued Logic.” In In honor to Roman Jakobson. Essays on the Occasion of His Seventieth Birthday, 475-482. Hague — Paris: Mouton.

3. Malinowski, Bronisław (1935) Coral Gardens and Their Magic. Vol. 2. New York: American Book Company.

4. Quine, Willard Van Orman (1960) Word and Object. New York — London: Wiley.