The logic of conceiving of the sentential schemes

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The memory of Professor Andrzej Grzegorczyk

Formalization can be conceived as a representation of logical knowledge [1]. In the pragmatic sense, texts are conceived, i.e. there are procedures of unique usage of data for agents communicating with each other. Identical usage of data types determines the unit of knowledge, and the set of unit of knowledge is (in this sense) knowledge [2]. Conceiving of texts is establishing of knowledge represented by these texts. Texts representing logical knowledge include the following expressions: “a scheme of a sentence”, “a scheme of a true sentence”, “a scheme a sentence that is not true” and the phrase “is conceived as ...”. This phrase is denoted as ≡. There are considered schemes of complex sentences: the negation (¬), the conjunction (∧), the alternative (∨), the implication (⇒) and the equivalence (⇔) of sentences. These schemes are not only for the two sentences but also for three, four or more sentences. These sentences represent knowledge, which may consist of several fields of knowledge. For example:

Consider the equivalence of sentences "Kowalski is a minister in the Polish government", "Kowalski works in Warsaw", "Kowalski works in the Ministry". If the last sentence “Kowalski works in the Ministry” is true, then first two sentences are conceived as equivalence. Furthermore, if the last sentence is not true then first and second sentences are not conceived as equivalence.

The logic of conceiving is a formal system of conceiving texts representing logical knowledge. The system of conceiving of logical knowledge represented by logical expressions of the propositional calculus is the logic of conceiving of the sentential schemes. Moreover, the relation of conceiving of formulas satisfies the following conditions:

<formula> ≡ a scheme of a sentence; 1 ≡ a scheme of a true sentence; 0 ≡ a scheme a sentence that is not true; ¬<formula> ≡ a scheme of a sentence negation; < connective >(< finite sequence of formulas >) ≡ schema binding connective finite sequence of sentences

The conceiving of schemes of sentential conjunctions can be determined recursively:

\[ \Delta(F_1, F_2) \equiv (F_1 \land F_2) \]

\[ \Delta(F_1, ..., F_{n-1}, F_n) \equiv \begin{cases} \Delta(F_1, ..., F_{n-1}) , & \text{if } F_n \equiv 1; \\ ¬(\Delta(F_1, ..., F_{n-1})) , & \text{if } F_n \equiv 0; \end{cases} \]

where Δ is one of the symbols of the sentential conjunctions, and \( F_n \) for \( i = 1, 2, ..., n \) are arbitrary formulas. The tautologies are the formulas conceived as schemas of true sentences, regardless of conceiving propositional variables (sentential variable) as 1 or 0. For example:

1. \((\leftrightarrow(p,q,r)) \leftrightarrow ((p \leftrightarrow q) \leftrightarrow r); (\leftrightarrow(p,q,r)) \leftrightarrow ((r \leftrightarrow p) \leftrightarrow q); (\leftrightarrow(p,q,r)) \leftrightarrow ((q \leftrightarrow r) \leftrightarrow p).\)

2. 

3. 

4. De Morgan laws

The references:
