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A note to Richard Montague grammar

Many people have heard about the Leibnizian idea of *lingua characteristica*, an imaginary language that may solve peoples' problems. The project put forward by the great mathematician and philosopher was to unify people via mastering (by inventing and popularizing) the common language similar in its universality to the one people used to speak in Eden. The new language should be written, not spoken. Its Latin name, *lingua characteristica*, means it should be a graphical language. The new miraculous language would express true sentences as one could not cheat using its characters (because everybody could easily notice the mistake in calculations), which would eliminate false authorities, being at the same time exceptionally easy for everybody to learn.

Taking geometry as an exemplum, Leibniz seeks to invent a graphic way of expressing meanings, being positive that having a few skilled helpers he can finish his work in a couple of years. A few skilled helpers had he indeed, as well as very numerous followers. Some of them shared his goals, and some the method.

Among those whose attempts are similar to those of Leibniz, as far as their goal is concerned, there are Ludwig Zamenhof with his Esperanto, Anna Wierzbicka and her Lingua Mentalis project, as well as Elmer J. Hankes presenting the "universal second language". The most successful among them is Ludwig Zamenhof. Doctor Esperanto, as Zamenhof signed his first books on the new language, hoped (and partly succeeded) to popularize a method of communication which would be ethnically and politically neutral. He was not conscious how very Indo-European and Roman was its bias. Still, one may speak of a success of his beautiful Espero (hope). Anna Wierzbicka offers what she calls explications for lexical items, grammatical structures and illocutions of Polish and English, usually presented using the language analysed, but trying to establish the minimal vocabulary list. Elmer Hankes presents a new "polite foreign langue" having its own alphabet and pronunciation rules together with a recording (and plans of controlling its users lest they would be impolite.) The language contains recognizable elements of natural languages, but is really exotic for an average English reader. All the new languages are meant to make life simpler, as they share the good intentions of Leibniz. The method of reaching this goal is each time the author's own. One

may look at these attempts as at translations into Markerese (as David Lewis put it, writing about semantic markers of generative grammarians.)

Leibnizian graphical method, on the other hand, is being developed by logicians who generally do not plan their written signs to be understandable by average citizens. The naïve hope that we may calculate everything having the magical lingua graphica at our disposal was visible many years after Leibniz passed away, in David Hilbert's philosophy of mathematics which excluded the possibility of there existing truths we will never learn. In mathematics, Hilbert says, there is no *ignorabimus (we will not know*). This enthusiasm had to face the brutal fact of logicians proving Goedel's theorem, which is a formal counterpart of the Liar's paradox. One could say, in the Liar's paradox one speaking a natural language says "what I am telling you is a lie", and in Goedel's paradox a thesis of Peano arithmetics states it is not a thesis of Peano arithmetics.

Richard Montague wrote a grammar of "English as a natural language", in which he uses his mathematical skill to develop a sort of categorial grammar. Montague was Alfred Tarski's PhD student, thus what is particularly interesting to see is how Montague's construction works (if it does) in what Tarski indicated to be weak points of such formalizations. Naturally, Montague's grammar is an influential device not to be ignored, but so is a natural language.

Perhaps the most famous among Tarski's achievements is his T-scheme. Among the men of genius, Tarski was a humble one and admitted that his invention was valid for formal languages only, and not for the natural ones. Among the reasons he gave there is the fact that a natural language lacks:

1. a satisfactory structural definition of a declarative sentence,
2. an established lexicon (of both potential and actual words) of the language.

These two missing parts are hard to notice for someone using his everyday language, especially if the person has been taught at the primary school what a declarative sentence is and has not yet noticed the continuous changes of its lexicon. Whatever the situation of the user may be, both the precise definition of a sentence and an established lexicon are still missing.

Tarski, in making efforts to define a sentence of natural language, tried to delimit the area of research to the true declarative sentences. He was trying to establish in this way the relation of

consequence that would preserve the logical value like it is in the language of sentential logic. He abandoned these efforts as he found them hopeless. However, they are worth mentioning, as the situation of defining a true sentence involves facing other interesting problems which Tarski defined in his papers. They concern semantic concepts (which are the bad penny for logicians studying semantics of a natural language) and the function or value problem concerning functions.

Why semantic concepts may be called the bad penny? Because they not only provide entertaining puzzles, but also cause problems if you try to describe their functioning. The worst of them is the adjective "true", forming the verb phrases "is true" and "is not true". This adjective appears in numerous other phrases having a different meaning: one may be hiding one's "true feelings", one may always "be true" to somebody or to one's word, physical objects may "not be quite true" or even a quarter inch "out of true". The semantic concepts of natural language are not precise enough to reflect ideas of pure logic, one could say, forgetting it was logicians who started imitating the reasoning of native speakers. Other problems consist in the presence, in a natural language, the rules of the usage of semantic concepts and the names of that language expressions. Having all these properties in a natural language, we cannot avoid antinomies.

There is another difficulty that Tarski expected his readers to encounter: hearing about the definition of truth, they would expect magical skills associated with the definition (they would mistake knowing the truth conditions for knowing if they were actually satisfied). The problem is, however, that knowing the function we still do not know its value for the particular argument, like knowing the sinus function we do not neccesarily know yet the sinus of 43 degrees.

The truth is declared to be important in Montague's grammar, too. Semantic value of verb phrases is being defined by Montague as a function from individuals to truth values. Some of these functions are usually quite simple for a healthy free adult to decide their logical value (though it is difficult to find cross-cultural examples). But definitely the sinus example may remind us it is not always the case.

In Montague [1979] the author lists 9 basic syntactic categories. Three of them seem to be particularly interesting in the contexts. These are as the following quotation (simplified notation):

"B2 (or the set of *basic one-place verb phrases*) [e.g.] *walks*",

"B5 (or the set of *basic adformula phrases*), [e.g.] *not*, […], *believes that*",

"B8 (or the set of *basic adjective phrases*) consists of all "ordinary" descriptive adjectives of English (that is to say, with the exception of such "indexical" adjectives as *former*, such "quantificational" adjectives as *every*, *most* and *three* [sic!], and adjectives of certain other exceptional varieties […]."

B2 does not seem to contain the one-place verb phrase *is true*, though the phrase requires just one argument to make an everyday expression like [x] *is true* [and thus should belong to this category, though it is not mentioned there. In the index in Montague 1979 there is no such entry, either]; it could also combine with elements of B5.

B5 contains items that, if added to previous categories, would make it possible to build an expression like [x] *is not true*, [y] *believes that not.* [I realize these sentences are not the ones Montague intended to create, as the *that* was meant to introduce a clause and not as a pronoun. I am deliberately misinterpreting the Montague's paper, just to show the dark side of English as a natural language.]

B8 The exceptions make it hardly possible to indicate a given sentence (and try to build an antinomy about it), especially when we have hardly any possibility of quoting it in the system of signs that is meant to seem natural. In natural language we are free to quote and also to construct paradoxes. Montague grammar may seem deliberately restricted.

Thus, Montague's grammar is not the realization of the Leibnizian dream of a universal language. But (owing to the logic he once helped to develop) we may now answer why it is not.

BIBLIOGRAPHY

[1] Austin, John Langshaw, 1962. How to do things with words. Oxford University Press.

[2] Collins Cobuild English Language Dictionary, 1990, London..

[3] Dowty, David R., Robert E. Wall and Stanley Peters, 1981, *Introduction to Montague Semantics*. Dordrecht: D. Reidel Publishing Company.

[4] Lewis, David, 1972. General semantics. [In:] Davidson and Harman, eds. Semantics of natural language. Dordrecht: Reidel, pp. 169-218.

[5] Montague, Richard, 1979. "English as a formal language", in: Richard Montague, *Formal philosophy. Selected papers of Richard Montague.* (Richmond H. Thomason, ed.) New Haven: Yale University Press.

[6] Pietryga, Anna, 2007. "Tarski's T-scheme as an alleged basis of Montague Semantics". *Logic and Logical Philosophy*, vol.15, no.4.

[7] Pietryga, Anna, 2008. "Leibniza '*lingua characteristica'* i jej współczesne odpowiedniki". http://www.pts.edu.pl/teksty/ap2.pdf

[8] Tarski, Alfred, 1995a (1933). „Pojęcie prawdy w językach nauk dedukcyjnych" w: Tarski 1995, „*Pisma logiczno-filozoficzne*", vol. 1 „*Prawda*". Warszawa: Wydawnictwo Naukowe PWN, ss 13-172.

[9] Tarski, Alfred, 1995b (1933). „Prawda i dowód" w: Tarski 1995, „Pisma logiczno-filozoficzne", vol.1 „*Prawda*". Warszawa: Wydawnictwo Naukowe PWN, ss. 293-332.