Thursday, June 26th, 9:30-10:00, room 201

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Quantifiers in ordinary language in the light of Ludwik Borkowski's theory of 'proper quantifiers'

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The paper shows how expressions like, for example, 'for all', for some', 'for none', 'for only some', etc. that are considered to be different quantifiers in ordinary language, can be formally described by theory of 'proper quantifiers' of the monadic predicate calculus. The theory was introduced by Ludwik Borkowski – Polish logician and philosopher.

The first section defines the notion of 'proper quantifier'. Informally, 'proper quantifiers' are not numerical quantifiers like, for example, 'for at least 3 *x*, f*x*', 'for an infinite number of *x*, f*x*', etc. To make a formal definition, Borkowski introduces the notion of 'the quantifier of *n* arguments (for any natural number $n \geq 1$)'. 'Proper quantifiers of *n* arguments' of the monadic predicate calculus form expressions consisting only of f*x*, g*x* etc. propositional functions, universal (") or existential quantifier ($) binding the variable '*x*' and logical connectives.

The second section is concerned with Borkowski's idea that 'proper quantifiers of *n* arguments' are characterized by 'quantifier matrices'. The matrix of the proper quantifier of *n* arguments is a function which is defined for all non-empty subsets of the set of *n*-termed sequences formed of the elements of the set {1, 0}, and which assumes as values elements of the set {1, 0} In the case of 'proper quantifiers' of one argument, 'quantifier matrix' is a function from all non-empty subsets of the set of *1*-termed sequences formed of the elements of the set {1, 0} to the set {1, 0}.

Finally, the third section presents that an intuition according to which expressions like, for example, 'for all', for some', 'for none', 'for only some', etc., are in fact different quantifiers can be grasped by Borkowski's theory. Roughly speaking, expressions like 'for all', for some', 'for none', 'for only some', etc., are different 'quantifier matrices'. The final conclusion is that the theory of 'proper quantifiers' provides convenient logical tool for analyzing quantifiers in ordinary language.