Metalogic

Spring Semester 2023

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- Webpage:
  http://phil.elte.hu/mate/metalogic/metalogic.html.
  Presentations (pdf-s) will be published after the classes.

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Circularity- ('hen and egg'-)problem in foundations: the relation between syntax (proof theory) and semantics (set theory).

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Or: a functor is an *automaton* taking expressions as inputs and producing another expression as the output.

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A special dyadic predicate: identity. If a and b are strings, then $a = b$ is the sentence saying that a and b are the same string.

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Logical tools I.: quantifiers and variables

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Plus: they can occur in quantifying expressions (QE-s) consisting of a quantifier ($\bigvee$ or $\bigwedge$) and a variable.

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The *intended universe* of this metalanguage is the class of finite strings of letters of some finite alphabet. Quantification is defined by substitution and by this, we are not committed to the existence of some set-theoretic universe built on this class.

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If you studied classical propositional logic, use the truth conditions learned there for such sentences.

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The quasi-quotation marks $\ulcorner$ and $\urcorner$ delimit schemes of metalanguage expressions where some schematic letters (A, B, $C, \ldots$) occur which can be substituted by expressions of some certain (declared) type. The items on the previous slide should be understood as e.g. for each sentence A and B, the string resulting from the concatenation of A, the sign ‘$\wedge$’ and B is a sentence again. So, distinctly from the common quotation marks, it is possible to quantify into the expressions delimited by quasi-quotation marks from the outside. It is important again that this quantification should be interpreted by substitution.

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The first four items are together the radix of the language. We want to describe it axiomatically because we don't want to refer to set theory for making precise the concepts (finiteness etc.) used in the above enumeration.

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$$\text{That's all.} \tag{R7}$$