Sequent Calculi for Three non-Fregean Theories

Agata Tomczyk

Abstract

The aim of the work is to present three sequent calculi for three axiomatic extensions of non-Fregean logic called *Sentential Calculus with Identity* (SCI). Theories WB, WT and WH are formalised as sequent calculi through the addition of different identity-dedicated rules, thus obtaining, respectively, $G3_{WB}$ (in this case the sequents are additionally labelled to control the application of rules), $G3_{WT}$ and $G3_{WH}$. In the case of $G3_{WB}$ and $G3_{WT}$ the added rules refer to the definitions of theories through consequence operation, whereas for WH, the added rule is a formalization of an axiom. In the resulted proof systems the main problems are concerned with the admissibility of structural rules. Due to the addition of right-sided rules in $G3_{WB}$ and $G3_{WT}$ the cut rule can be eliminated provided the weakening rule is included in the set of rules; the same goes for $G3_{WH}$ since it is built upon $G3_{WT}$. The mentioned analysis was accompanied by adapting algebraic semantics to sequents along with providing proofs for completeness and soundness with regard to these semantics, that is, respectively, Boole algebra, topological Boolean algebra and Henle algebra. The work indicates the differences within the semantic description of the resulted sequent calculi, which are stemming from the utilisation of the three mentioned algebraic systems.