# TABLEAUX – A VIEW FROM BELGRADE

M. KAPETANOVIĆ

## 1. Founding fathers

*Evert Willem Beth* (1908 – 1964), Dutch philosopher and logician

*Jaakko Hintikka* (born 1929), Finnish philosopher and logician

*Raymond Merrill Smullyan* (born 1919), American mathematician, concert pianist, logician, Taoist philosopher and magician

## 2. The method

- systematic search for a *countermodel* for a given set of sentences using certain reduction rules;
- a tableau proof has the form of a *refutation tree*: all branches are *closed* (intuitively, they contain a contradiction);
- if a tableau does not close, then any open branch determines a model of all sentences at the root.

## 3. Beginnings and some results

1973 An M.Sc. thesis [1] is done in which a chapter is devoted to a Smullyan style tableau system for a particular many-valued propositional calculus,

1980 A paper [2] is published in which the tableau system just mentioned is presented in full detail and correctness and completeness are proved.

1981 Another paper appears (see [3]) in which the modal propositonal logic now known as **GL** is treated in the *prefixed tableau* style of Smullyan and Fitting. Again correctness and completeness are proved.

1987 In the paper [4] a particular form of tableaux devised by Boolos are used as a tool for finding *finite* models of sentences. A more general case is considered with both function symbols and equality present.

1989 In [5] a new form of tableaux are defined, called *dual tableaux*, because their rules are in a sense dual to the usual ones. Correctness and completeness are proved using a form of resolution argument. This enabled the use of the system as a basis for building theorem provers.

## 4. 21st Century

2001 As a novelty, in [6] the tableau method is applied to a particular *substructural* logic, the so called BCK logic. Further, a theorem prover is designed based on this set of rules nad the algorithm is described.

2007a A very useful expository paper [7] appears in which, among other things, a survey of substructural tableaux is given.

2007b The applicability of tableaux is in [8] illustrated by presenting a system for $L_{\omega_1\omega}$ logic as well as by proving a general form of Malitz interpolation theorem.

## References

[1] M. Kapetanović: *On some many-valued sentential calculi* (in Serbo-Croatian), M.Sc. Thesis, Beograd, 1973

[2] M. Kapetanović: *On a many valued sentential calculus*, Publ. Inst. Math. **27**(**41**), 1980, pp. 103-106

[3] M. Kapetanović: *A Tableaux System in Modal Logic*, Publ. de l'Inst. Math. N.S., **30** (**44**), 1981, pp. 65-67

[4] M. Kapetanović, A. Krapež: *More on trees and finite satisfiability: the taming of terms*, Notre Dame J. of Formal Logic **28** (1987), pp. 392-394

[5] M. Kapetanović, A. Krapež: *A proof procedure for the first order logic*, Publ. Inst. Math. **45** (**59**), 1989, pp. 3-5

[6] M. Kapetanović, M. Isaković-Ilić *A tableau based prover for BCK logic*, XIV Conference on Applied Mathematics, Novi Sad 2001, pp. 26-30

[7] Mirjana Isaković Ilić: *Theorem Provers for Substructural Logics*, Publ. Inst. Math. **82** (**96**), 2007, pp. 55-78

[8] M. Kapetanović: *Analytic Tableaux and Interpolation*, Publ. Inst. Math. **82** (**96**), 2007, pp. 93-97

Matematički institut SANU, Knez Mihailova 36/III, 11001 Beograd, p.p.367, Serbia

*E-mail address*: kapi@mi.sanu.ac.yu