

## A History of Logic Trees

### Editor's Note

The use of graphical methods in logic can be traced back, in one form or another, to the "tree of Porphyry", in the third century A.D. Martin Gardner, in his history *Logic machines and diagrams* (Brighton, Harvester Press, 2nd ed., 1983, p. 29), has even suggested that Aristotle used tree diagrams to represent successive subdivisions of genera and species. For further discussions of some of the graphical methods in logic, and in particular of Euler diagrams and Venn diagrams, see also H.G. Hubbeling, *A diagram-method in propositional logic*, *Logique et Analyse* 8 (1965), 277-288, A.S. Kuzichev, *Diagrammy Venna*, in *Istoriia i Primeneniia* (Moscow, Nauka, 1968), and Z.A. Kuzicheva, *Graficheskie metody logiki klassov*, *Istoriia i Metodologiya Estestvennykh Nauk* 29 (1982), 75-85, the latter paper dealing not only with Venn diagrams and Euler diagrams, but also with Lambert diagrams and De Morgan diagrams.

In the two papers that follow, the authors are concerned with the modern development of trees as mechanical decision procedures and as tests of the validity of logical deductions. The article by Francine Abeles focuses on the nineteenth-century development by Charles Dodgson (Lewis Carroll) of trees for syllogisms, while the article by Irving Anellis focuses on the recent evolution of truth trees and falsifiability trees for first-order quantification theory from Gentzen's natural deduction sequents (N-sequents) by Beth, Hintikka, Smullyan, and van Heijenoort. Both of these developments of trees are shown to have close associations with the semantic tableaux of E.W. Beth.

The trees developed by Carroll in 1894, which anticipate concepts later articulated by Beth in his development of deductive and semantic tableaux, have their roots in the work of Charles Peirce, Peirce's students and colleagues, and in particular in Peirce's own existential graphs. The trees developed by Hintikka, Smullyan, and van Heijenoort in the 1950s and 1960s are simplifications of Beth's semantic tableaux. Although Beth showed in his booklet *La crise de la raison de la logique* (pp. 24-28; Paris, Gauthier-Villars & Louvain, Nauwelaerts, 1957) that his method of semantic tableaux could be applied directly to the assertoric syllogisms of classical logic, it is still not clear that this line of development from Peirce and Carroll to Beth and from Beth to