

- JAMES CARR, NICK BEZHANISHVILI, AND TOMMASO MORASCHINI, *Hereditary structural completeness over K_4* .

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In deductive systems, a rule is said to be *admissible* iff the tautologies of the system are closed under its applications and *derivable* iff the rule itself holds in the system [3]. Whilst every derivable rule for a system is admissible, whether the converse holds varies between deductive systems. When it does we say the system is *structurally complete*. The classical propositional calculus is structurally complete, whilst many non-classical systems including the intuitionistic propositional calculus are not [1]. Early investigations into structural completeness, indicated it may be possible to precisely characterise the *hereditarily structurally complete* (HSC) systems, SC systems whose finitary extension are also SC. This proved a fruitful question, Citkin [2] produced a characterisation for intermediate logics and Rybakov [4] did so for transitive modal logics. Both these characterisations take a similar form, identifying a small collection of problematic models whose omission is necessary and sufficient for a logic to be HSC.

Recently Bezhanishvili and Moraschini gave a new self-contained proof of Citkin's result by drawing on theory in abstract algebraic logic and Esakia duality [1]. A similar framework exists for transitive modal logics that utilises a duality for modal algebras, and in this talk we explain how one can apply this to obtain a new proof of Rybakov's result. However, more than simply providing this new proof of Rybakov's theorem, the approach illuminates a mistake in Rybakov's characterisation. Accordingly, we establish and prove a revised characterisation of the HSC transitive modal logics.

[1] BEZHANISHVILI, N. AND MORASCHINI, T, *Hereditarily structurally complete intermediate logics: Citkin's Theorem via Esakia duality*, <https://staff.fnwi.uva.nl/n.bezhanishvili/Papers/IPC-HSC.pdf>.

[2] CITKIN, A., *On structurally complete superintuitionistic logics*, *Soviet Mathematics Doklady*, vol. 19 (1978) pp. 816-819.

[3] J. RAFTERY, *Admissible Rules and the Leibniz Hierarchy*, *Notre Dame Journal of Formal Logic*, vol. 57 (2016) pp. 569-606.

[4] RYBAKOV, V.V., *Hereditarily Structurally Complete Modal Logics*, *Association for Symbolic Logic*, vol. 60(1995) pp. 266-288.