

# Admissible Semantics for Quantified Modal and Temporal Logics

Rob Goldblatt  
Victoria University of Wellington

The term *admissible semantics* refers to the use of possible-worlds models having a restriction on which sets of worlds are admissible as propositions. Such models have proven effective in characterising propositional modal logics that are incomplete for their Kripke frame semantics.

There are axiomatically defined systems of quantified modal logic that cannot be characterised by the kind of possible-worlds models introduced by Kripke, even though the propositional fragments of those logics *are* characterised by their Kripke frames. We will describe how that this failure of completeness under Kripke semantics to lift from the propositional to the quantificational level can be overcome by developing a suitable notion of admissible model for quantified modal logics, leading to semantic characterisations of such logics in general. This requires a new interpretation of universal and existential quantifiers that takes into account the admissibility of propositions. The talk will explain the motivation for this interpretation.

It will also discuss an application to temporal logic. It has been known since the 1960's that temporal predicate logic over the real time flow is not recursively axiomatisable. What then of the axiom system that combines the standard deductive machinery of first-order logic with that of the temporal *propositional* logic of real time? It transpires that this system is strongly complete for validity in all *admissible* models over real time.

## Reference

*Quantifiers, Propositions and Identity: Admissible Semantics for Quantified Modal and Substructural Logics*. Lecture Notes in Logic 38, Cambridge University Press and the Association for Symbolic Logic, 2011.