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*Counting models of theories in non-first-order logics*

In 1970 Morley proved that a countable first-order theory has either at most $\aleph_1$ many or exactly $2^{\aleph_0}$ many isomorphism classes of countable models, regardless of the value of $2^{\aleph_0}$. Ideas implicit in Morley's proof give the stronger fact that if a countable first-order theory has strictly more than $\aleph_1$ isomorphism classes of countable models then it has a perfect set of pairwise non-isomorphic countable models. We consider the possible number of isomorphism classes of countable models, and whether there are perfect sets of non-isomorphic models, for theories of several stronger logics (including second-order logic, logics with game quantifiers, and logics with partially ordered quantifiers). For second-order theories we show that the statement analogous to Morley's result is independent of ZFC. This talk is based on joint work with Clovis Hamel, Sandra Müller, and Frank Tall.