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Gregory L. Cherlin*, Rutgers University, Department of Mathematics, 110 Frelinghuysen Raod, Piscataway, NJ 08554. *Model theory and algebraic groups.*

We discuss three connections between model theory and the theory of algebraic groups. Model theoretic methods have been applied to diophantine problems via a model theoretic analysis of abelian varieties in categories extending the algebraic category. In the reverse direction, the structure of algebraic groups has been applied in model theoretic contexts. On one hand, the structure of compact Lie groups has been shown to exercise great control over the structure of groups definable in suitable (o-minimal) expansions of the theory of the real field, and on the other hand it has been conjectured that the simple groups arising in Zilber's analysis of uncountably categorical theories are algebraic. (Classically, one of the incarnations of this line of thought is the Galois theory of differential equations.) While this algebraicity conjecture remains open in general, work in this direction involves substantial connections with the theory of finite simple groups, and has applications to the study of algebraic groups as permutation groups. (Received September 20, 2007)