

## Logics with Counting Quantifiers

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### Abstract

Counting quantifiers are expressions in formal languages having English glosses of the forms "there exist at least/at most/exactly  $C$  objects  $x$  such that ...  $x$  ...", where  $C$  is a natural number. In the context of first-order logic with equality, counting quantifiers have no effect on the expressive power, since they can all be defined by means of universal or existential quantifiers in the familiar way. In the context of many \*fragments\* of first-order logic, however, adding counting quantifiers considerably increases expressive power; and it is of interest to understand the effects which this increased expressiveness has on various model-theoretic and complexity-theoretic properties of these fragments.

This talk surveys the known results in this area. In particular, we consider the one- and two-variable fragments of first-order logic with counting quantifiers, modal logics with counting modalities and the guarded two-variable fragment of first-order logic with counting quantifiers. We round off---time permitting---with a numerical generalization of the Classical syllogistic.