A syntax for "exists unique up to isomorphism"

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Abstract.

Certain properties in category theory can be expressed via unique existential quantification; e.g. the property defining a limiting cone over a diagram D, or that defining the cartesian arrows of a functor $p : \mathcal{E} \to \mathcal{B}$. However, many other properties involve a kind of existence that is only unique up to (unique) isomorphism; e.g. the existence of a limit for a given diagram D, or the existence of cartesian lifts for a functor $p : \mathcal{E} \to \mathcal{B}$.

In joint work with Nicola Gambino, we define a syntax for this fragment of 2-dimensional logic and show that the corresponding 2-categories of models are accessible with flexible limits. This implies in particular that they have all bilimits and bicolimits, and satisfy an adjoint functor theorem (showing in particular that free such structures always exist).

Examples of 2-categories arising this way include those whose objects are: Categories with (co)limits of some shape, Grothendieck fibrations, Isofibrations, Clans, Regular/Exact categories, Mal'tsev categories, and Semiabilian categories.

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