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Mal'tsev reflection

It was showed in [1] that the fibers of the fibration $(\ )_0 : Grd\mathbb{E} \to \mathbb{E}$ associated with the internal groupoids in $\mathbb{E}$ are protomodular. No similar structural result existed for the fibers of the fibration $(\ )_0 : Cat\mathbb{E} \to \mathbb{E}$ associated with the internal categories in $\mathbb{E}$. A recent work about the category Mon of monoids [2], which is nothing but the fibre of this fibration above the singleton 1, focused our attention on classes of split epimorphisms between monoids (called Schreier, left homogeneous and homogeneous split epimophisms) satisfying partial aspects of the Mal'tsev and protomodular processes and properties. So it is quite natural to investigate whether the fibers $Cat_Y\mathbb{E}$ would not satisfy some property of this kind. This would be all the more interesting since it would produce a similar conceptual situation in a non-pointed context and would clarify the underlying relationship with Mal'tsevness and protomodularity which are not pointed concepts by themselves.

References:

[1] D. Bourn, Normalization equivalence, kernel equivalence and affine categories, in *Lecture Notes in Mathematics*, vol. 1488 (1991), Springer-Verlag, 43-62.

[2] D. Bourn, N. Martins-Ferreira, A. Montoli and M. Sobral, Schreier split epimorphisms in monoids and semirings, Preprint Univ. Coimbra, (2013).