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*Internal algebra classifiers as codescent objects of crossed internal categories*

This talk is a report on the work contained in the preprint [3]. In this work the setting of an *adjunction of 2-monads* is proposed as a general context for speaking about internal structures within an ambient structure. The problem of constructing the universal ambient structure containing the prescribed internal structure is studied. Following the work of Lack [2], these universal objects must be constructed as codescent objects of simplicial objects arising from our setting. We isolate the extra structure present on these simplicial objects which enable their codescent objects to be computed. These are the *crossed internal categories* of the title, and generalise the crossed simplicial groups of Loday and Fiedorowicz [1].

The most general results of this work are concerned with how to compute such codescent objects in 2-categories of internal categories, and on isolating conditions on our monad-theoretic situation which enable these results to apply. Combined with earlier work [4] in which operads are seen as polynomial 2-monads, our results are then applied to the theory of non-symmetric, symmetric and braided operads. In particular, the well-known construction of a PROP from an operad is recovered, as an illustration of our techniques.

References:

- [1] Z. Fiedorowicz and J.-L Loday. Crossed simplicial groups and their associated homology. *Transactions of the AMS*, 326(1):57–87, 1991.
- [2] S. Lack. Codescent objects and coherence. *J. Pure Appl. Algebra*, 175:223–241, 2002.
- [3] M. Weber. Internal algebra classifiers as codescent objects of crossed internal categories. ArXiv:1503.07585.
- [4] M. Weber. Operads as polynomial 2-monads. ArXiv:1412.7599.