

By now it is clear, mainly through a heavy accumulations of examples and general results, that the Hopf-Cyclic cohomology of Connes-Moscovici and its generalizations is the right analogue of group and Lie algebra cohomology to quantum groups and Hopf algebras in general. There is however a certain need to go beyond the case of ‘clean cut’ Hopf algebras and try to see if the theory can absorb these more general Hopf algebra like objects. One big and important class among such is the class of (co-)quasi Hopf algebras. They are not Hopf algebras in that they lack the (co)commutativity and other compatibility axioms needed for a Hopf algebra. One way to look at this problem is to try to develop a Hopf cyclic theory for Hopf algebra objects in an abelian braided monoidal category. The theory works perfectly well in the symmetric case. In the general braided case, there are interesting relations between powers of the cyclic operator in the cyclic module and the braiding operation in the category. By passing to quotients one indeed obtains a cyclic module. I gave several examples where one needs to test this theory, the most notable one being the twisted (by a 3 cocycle) Drinfeld double of a group which is a simple example of a fusion algebra. This is joint work with my student Arash Pourkia. We shall post the paper soon.