Finite groups, spherical 2-categories, and 4-manifold invariants

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In my talk I will define a class of state-sum invariants of compact closed oriented piece-wise linear 4-manifolds using finite groups, following [2]. The definition of these state-sums follows from the general abstract construction of 4-manifold invariants using spherical 2-categories, as I defined in [1], although it requires a slight generalization of that construction.

I will show that the state-sum invariants of Birmingham and Rakowski (see references in [2]), who studied Dijkgraaf-Witten type invariants in dimension 4, are special examples of the general construction that I present in [2]. They showed that their invariants are non-trivial by some explicit computations, so my construction includes interesting examples already.

Finally, I will indicate how my construction is related to homotopy 3-types. This connection suggests that there are many more interesting examples of this construction to be found in the work on homotopy 3-types, such as by Brown (see references in [2]), for example.

References

[1] Marco Mackaay, *Spherical 2-categories and 4-manifold invariants*, to appear in Adv. Math; Preprint available as math.QA/9805030.

[2] Marco Mackaay, *Finite groups, spherical 2-categories, and 4-manifold invariants*, preprint available as math.QA/9903003.