Presheaves and Diagrams on the Burnside 2-Category

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In category theory and homotopy theory, the Burnside category of a finite group G has applications in the areas of equivariant stable homotopy theory and theory of Mackey functors. As the name suggests, the Burnside 2-Category is the 2-Categorical version of it. The Burnside category is naturally self-dual i.e, there is an isomorphism between itself and its opposite category. This self duality has important consequences in the theory of equivariant algebraic K-theory, homotopy theory of G-spaces and spectra. In particular looking at enriched presheaves on the Burnside category is equivalent to considering diagrams on it. We investigate whether this kind of equivalence can be observed in case of the Burnside 2-category as well, where the enrichment is over the category of strict permutative categories . It turns out, the natural extension of the above mentioned isomorphism does not provide an equivalence between the opposite 2-categories. In fact, it only gives a pseudofunctor. Thus we cannot immediately conclude about the equivalence of presheaves and diagrams on the Burnside 2-category. We try to go about this problem using strictification, a method to “strictify” a pseudofunctor into a 2-functor.