A categorical approach to paragroup theory and the center (quantum double) of tensor categories

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The first steps of a category theoretic formalism of paragroups in the sense of Ocneanu are developed. The formalism is applied to the center (or quantum double) $Z(\mathcal{C})$ of a tensor *-category $\mathcal{C}$. We prove that if $\mathcal{C}$ is rational, i.e. has only finitely many isomorphism classes of irreducible objects, $Z(\mathcal{C})$ is rational and in fact modular in the sense of Turaev. Defining the dimension of a category to be the sum over the squared dimensions of the (isom. classes of) irreducible objects, we prove: $dim\, Z(\mathcal{C}) = (dim\, \mathcal{C})^2$. These results are non-trivial generalizations of properties of Drinfeld's quantum double for Hopf algebras.