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Interchange for n-categories via distributive laws

In an n-category, k-cells have k different kinds of composition - along bounding cells of each lower dimension - and these different kinds of composition must interact coherently. The axioms for this interaction generalise the middle four interchange law in a 2-category governing the interaction between horizontal and vertical composition of 2-cells. We will examine the case when these axioms are satisfied strictly, and show how to express this via distributive laws. Ordinary distributive laws between two monads on a category give us a way of combining two different algebraic structures on the same category, in a coherent manner. We will generalise this to combine more than two structures on the same category. We will then use n monads on the category of n-dimensional globular sets to describe n-categories in which interchange is strict; each monad will give composition along a different dimension of bounding cell. Such "semi-strict" n-categories are expected to be of interest for proving coherence for n-categories and also for studying homotopy types.

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