SKEW MONOIDAL CATEGORIES AND THE PROOF-THEORETIC ANATOMY OF ASSOCIATIVITY (AND UNITALITY)

NOAM ZEILBERGER

The talk will survey a recent line of work, which takes a proof-theoretic approach to solving the coherence problem(s) for skew monoidal categories and related structures. I will begin by discussing the so-called Tamari order on fully-bracketed words induced by a semi-associative law (AB)C ¡= A(BC), and explain how a simple sequent calculus may account for some of its fascinating properties, such as the fact that the set of fully-bracketed words on $n + 1$ letters forms a lattice Y_n under this order, as well as a remarkable formula counting the number of intervals in Y_n. Then I will recall the definition of skew monoidal categories, and explain how a more refined sequent calculus may be used to solve two related coherence problems: deciding equality of maps and enumerating homsets in free skew monoidal categories. Closely related to recent work by Bourke and Lack, this sequent calculus may be considered as a canonical construction of the free left representable skew multicategory over a set of atoms. Finally, I will briefly discuss variations of the sequent calculus capturing "partially skew" monoidal categories with different normality conditions.

Based on joint work with Tarmo Uustalu and Niccol Veltri.

References: [1] https://arxiv.org/abs/1803.10080 [2] https://arxiv.org/abs/2003.05213 [3] https://arxiv.org/abs/2101.10487