

# A diagrammatic representation of the Temperley–Lieb algebra

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**Abstract:** One aspect of my research involves trying to prove that certain associative algebras can be faithfully represented using “diagrams.” These diagrammatic representations are not only nice to look at, but they also help us recognize things about the original algebra that we may not have otherwise noticed. In this talk, we will discuss one example of a diagram algebra by introducing the diagram calculus for the Temperley–Lieb algebra, denoted  $TL_n$ . This algebra, invented by Temperley and Lieb in 1971, is a certain finite dimensional associative algebra, which arose in the context of statistical mechanics in physics. We will show that  $TL_n$  has dimension equal to the  $n$ th Catalan number and also discuss its relationship to the symmetric group.