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The shadows of quasisymmetric Templerley—Lieb coinvariants are noncrossing partitions

In the early 2000s, Hivert and Aval, Bergeron, and Bergeron found compelling evidence that the Templerley—Lieb algebra $\mathrm{TL}_n(2)$ and the quasisymmetric polynomials QSym_n in $R = \mathbb{C}[x_1, \ldots, x_n]$ should have a coinvariant theory much like the symmetric group and symmetric polynomials. Unfortunately, pinning down the details of this relationship is harder than expected, and a $\mathrm{TL}_n(2)$ action on $R/\langle \mathrm{QSym}_n^+ \rangle$ has eluded description for almost 20 years. I will describe how noncrossing partitions can take us from the Templerley—Lieb algebra to quasisymmetric polynomials and back, moving one step closer to a true coinvariant theory along the way. Based on joint work with Nantel Bergeron.